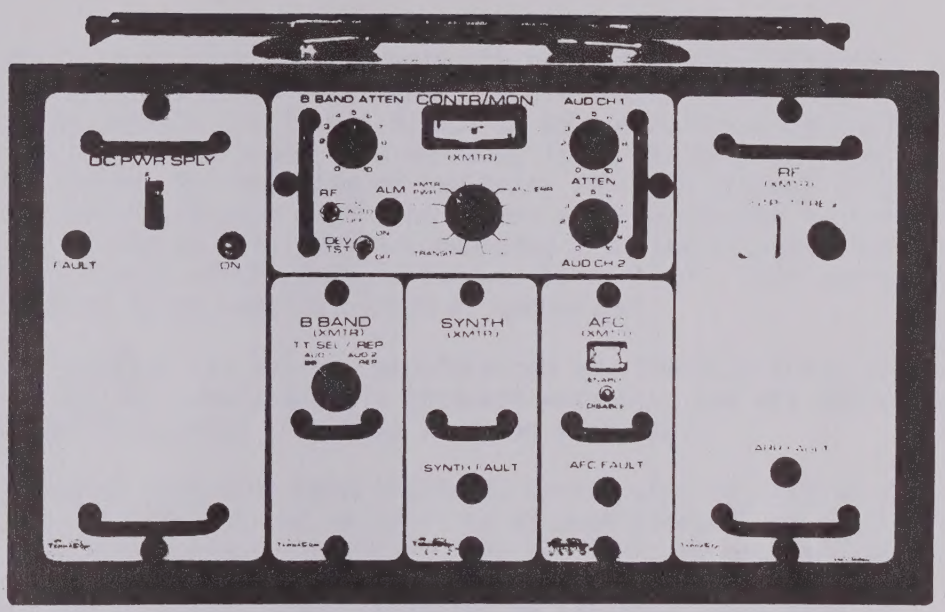
LORAL TERRACOM

003-0157



OPERATOR'S MANUAL
TERRACOM TCM-6 SERIES
MICROWAVE TRANSMITTER

PROPRIETARY RIGHTS

are involved in the subject matter of this material and all manufacturing, reproduction, use and sales rights pertaining to such matter are expressly reserved. It is submitted in confidence for a specified purpose, and the recipient, by accepting this material, agrees that this material will not be used, copied or reproduced in whole or in part, nor its contents revealed in any manner, or to any person, except for the purpose delivered.

80A

*** WARNING ***

Beryllium oxide may be used as an electrical insulator/thermal conductor in capacitors and other electronic components contained in this equipment. Beryllium oxide easily goes to powder when crushed and in this form represents a toxic health hazard. Care should be taken to avoid crushing components which may contain beryllium oxide. In the event that suspected beryllium oxide powder is inhaled or swallowed, obtain medical assistance immediately.

TABLE OF CONTENTS

SECTION/PARAGRAPH	TITLE
Section 1	INTRODUCTION
1.1.	General Information
1.2.	Description
1.3.	Options
1.4.	Specifications
Section 2	INSTALLATION
2.1.	General Information
2.2.	Index
2.3.	Radio Installation
2.4.	Remote RF Head Installation
Section 3	OPERATING INSTRUCTIONS
3.1.	Controls/Indicators/Connectors
3.2.	Transmitter Turn-On-RF Head Not Remoted
3.3.	Transmitter Turn-On-RF-Head Remoted
3.4.	Transmitter Tuning Procedure
Section 4	CIRCUIT OPERATION
4.1.	General Information
4.2.	Detailed Circuit Description Numerical Index
Section 5	MAINTENANCE
5.1.	General Information
5.2.	Maintenance Procedure
5.3.	Audio Program Channel Test
5.4.	Troubleshooting Techniques
5.5.	Test Requirement Specifications

Section 6 PARTS LIST
6.1. General Information
6.2. Numerical Index

Section 7 SCHEMATICS AND DRAWINGS
7.1. General Information
7.2. Numerical Index

SECTION 1

INTRODUCTION

1.1 GENERAL INFORMATION

This manual contains the information required to install, operate, test and adjust the TCM-6 Series Microwave Transmitter. The scope of this manual is confined to module level theory and other information required for field operation and repair. Component level information is contained in the TCM-6 Maintenance Manual, available from TerraCom.

All standard modules and commonly used options available for the TCM-6 radio are detailed in this manual. The following paragraphs summarize the information found in each section.

1.1.1 SECTION 1, INTRODUCTION, covers a basic description of the transmitter, lists the available options and gives the overall specifications.

1.1.2 SECTION 2, INSTALLATION, provides information concerning transmitter and antenna mounting instructions.

1.1.3 SECTION 3, OPERATING INSTRUCTIONS, provides information about the controls and their functions and describes transmitter tuning procedures.

1.1.4 SECTION 4, CIRCUIT OPERATION, contains a complete set of Detailed Circuit Descriptions (DCD's) for all modules available for the transmitter.

1.1.5 SECTION 5, MAINTENANCE AND REPAIR, contains a Maintenance Procedure, Troubleshooting Techniques, and Test Requirements Specifications (TRS's) for all modules.

1.1.6 SECTION 6, PARTS LIST, provides a detailed parts list for each module used in the transmitter.

1.1.7 SECTION 7, SCHEMATICS AND DRAWINGS, contains a complete set of module wiring diagrams and necessary printed circuit board sche-

matic drawings.

1.1.8 A separate manual, TCM-6 Maintenance Manual, contains a complete set of Detailed Circuit Description, Schematics, Parts Lists and Test Requirement Specifications for both the transmitter and receiver. The Maintenance Manual is available to users who intend to perform component level corrective maintenance.

1.2 DESCRIPTION

The TCM-6 Series is a family of frequency-agile microwave radios operating in frequency bands from 1.7 GHz to 15.3 GHz. System capacity is color television with FM subcarriers, radar video, 1800 FDM voice channels or digital data. A range of options is available to meet special requirements. Mounting configurations include tripod, rack, mobile and bench in simplex and duplex systems. A remote RF Unit option allows the RF Unit plug-in module to be removed from the radio and located in a weatherproof enclosure at the antenna site.

1.2.1 TRANSMITTER COMPOSITION

The TCM-6 Transmitter is composed of seven units; a Power Supply Module, a Control Monitor Module, a Baseband Module, an AFC Module, a Synthesizer Module, an RF Module and an Enclosure Assembly. All modules are plug-in interchangeable among similarly configured radios.

1.2.2 TRANSMITTER SIGNAL FLOW - Video or Message Systems

The following description follows signal flow through the transmitter on a block diagram level. (Transmitters specially configured for data baseband inputs, repeater operation, etc., are described in following paragraphs). Refer to Block Diagram 12013349 at the end of this section.

The Baseband (message or video) and audio subcarrier input signals are applied to step attenuators in the Control Monitor Module for level adjustment. The Baseband attenuator may be preceded by a Message Amplifier to provide the proper input

signal level in message applications.

The attenuated Baseband input signal is coupled to the Baseband Module and applied to a Strap Attenuator which is set to produce the proper transmitter deviation. The signal is then applied to a Video Elliptical or Butterworth Low Pass Filter, depending on the application. If a Butterworth filter is used in conjunction with a subcarrier channel, a Subcarrier Notch Filter is employed to prevent the subcarrier from feeding backward in the Baseband signal path. The sharp cut-off characteristics of the Video Elliptical Filter make the use of a notch filter unnecessary. The baseband signal is then applied to a Pre-emphasis Network where it is preshaped according to the applicable CCIR recommendations. The Baseband signal is next coupled to the Summing Network.

Returning to the audio signal, the output from the attenuator(s) is coupled to Baseband Module where it FM modulates a subcarrier with a center frequency anywhere from 4.8 to 14 MHz. The audio subcarrier(s) is then applied to the Summing Network where it is combined with the Baseband signal.

If a biternary (digital) subcarrier input is used, the Subcarrier Attenuator is bypassed. The input signal is coupled to the Baseband Module and applied to a Data AGC circuit to produce the proper signal level. The level-adjusted signal is applied to a Biternary Subcarrier Modulator to produce a subcarrier input to the Summing Network.

If a remote RF Head is used, the combined signal is next applied to a Variable Amplitude Equalizer to compensate for various lengths of remoting cable. The output from the Equalizer (or Summing Network) is applied to an Invert/Non-Invert Amplifier to provide the proper level and signal polarity to the RF Module.

The Deviation Control circuit terminates the RF Module input

signal in the proper impedance and sets the deviation sensitivity of the VCO. A VCO Driver Amplifier is used with certain transmitter models where the output of the Deviation Control circuit is insufficient to properly deviate the VCO.

An Interface/Lamp Driver circuit at the input to the VCO isolates the incoming signal from the AFC DC bias and monitors the RF output power to provide an alarm when the detected RF voltage drops by 6 dB.

The VCO is FM modulated by the composite baseband signal to reproduce an output frequency between 1.7 and 2.5 GHz. The VCO may be fixed-tuned or, optionally, tunable to any frequency within its range by means of a front panel direct reading dial. The VCO output is passed through a Peripheral Mode isolator which provides a constant impedance at all frequencies, resulting in a low VSWR.

The signal is then amplified, multiplied as required to produce the correct output frequency, passed through an Interdigital Filter to suppress out-of-band signals and coupled to the antenna connector. An optional RF Standby Switch may be interposed between the Interdigital Filter and antenna connector to terminate the RF output when radiation is not desired. An optional Video Sync Detector may be used to operate the RF Standby relay. The Sync Detector is located in the Control Monitor Module to sense the video input signal sync pulse energy and to operate the RF Standby relay after 5-10 seconds absence of the sync pulse.

1.2.3 AFC CONTROL

The VCO signal is sampled and applied to a Mixer circuit where it is mixed with a signal from the Crystal Synthesizer or optional Digital Frequency Synthesizer. The Synthesizer frequency is selected to reproduce an input to the Mixer which, after multiplication, is 70 MHz higher than the VCO sample. The 70 MHz

difference frequency output from the Mixer is amplified and applied to the AFC Module.

The 70 MHz input to the AFC Module is filtered, applied to a Limiter Amplifier and then to a Frequency Discriminator. The Discriminator yields both a DC output for AFC applications and a baseband output for monitoring purposes.

The baseband output is applied to an optional Off-The-Air Monitor circuit consisting of a Baseband Preamplifier, De-emphasis Network and Baseband Amplifier. The Baseband Amplifier output appears at the rear panel Off-The-Air Monitor connector as a 1 volt peak-to-peak/75 ohm image of the Baseband input signal to the transmitter.

The DC output from the Discriminator is zero volts when the input is exactly 70 MHz, and some positive or negative voltage when the input is above or below 70 MHz. This DC voltage is displayed on the front panel AFC Meter for tuning purposes. In order to maintain transmitter frequency control in the event that the Synthesizer reference signal is lost, a Mute relay is employed to terminate the DC AFC signal and provide a nominal control voltage in its place.

The Mute Relay operates by sensing the loss of the 70 MHz signal at the Limiter Amplifier. An Enable/Disable switch at the Mute Relay output allows the AFC voltage to be terminated during transmitter tuning. Finally, the AFC control signal is applied to a Differential Amplifier, set to the proper polarity by means of a U-Link selector and coupled to the VCO.

1.2.4 TRANSMITTER SIGNAL FLOW - Heterodyne Radio Interface

The transmitter FMR Module is used in place of the Baseband Module when interface at 70 MHz with a heterodyne receiver is required. Refer to the transmitter FMR Module insert on Block Diagram 12013349. The 70 MHz signal is level adjusted, equalized

to compensate for group delays and applied to a Demodulator to recover the Baseband signal. This signal is amplified and polarity-adjusted, filtered and applied to the transmitter RF Module. If a remote RF Head is used, an optional Variable Amplitude Equalizer is installed in the FMR Module to compensate for various lengths of interconnecting cable.

1.2.5 TRANSMITTER SIGNAL FLOW-DIGITAL BASEBAND INPUT OPTION

The Data Module is used in place of the Baseband Module when data operation is desired. The Data Module accepts digital information and converts it to a partial response FM (biternary) signal. Since input data may be in various data formats, a number of plug-in interface converter PC boards are available to convert the input signal to the data format used within the module.

System timing can be supplied by an external source or, in its absence, by an internal Reference clock. A Timing Source Relay circuit automatically switches to the internal clock when the external source is not supplied.

The system data and clock are applied to a Randomizer which is a psuedo-random word generator with data mixing capability. The Randomizer maintains activity in the circuit to ensure a random noise transmitter spectrum regardless of input data activity.

The Randomizer output is applied to the TTL-to-NRZ Converter to produce a signal of one volt peak-to-peak symmetrical on zero VDC to allow for AC coupling into the Gaussian Filter. This filter has a cutoff frequency of about one-fourth the data rate which produces the partial response waveform.

The filtered signal is passed through a Strap Pad Attenuator and applied to a Mixer where it is combined with the output of the optional Service Channel Subcarrier Modulator. The resulting signal is then passed to the RF Module as the modulation signal.

1.2.6 REPEATER OPERATION

The function of the Repeater option is to bypass the frequency shaping elements, the Low Power Filter and Pre-emphasis Network in the transmitter Baseband Module. This is accomplished by setting the TT/REP switch on the Baseband Module to the REP position. A modified Strap Attenuator is switched into the bypass leg to allow for signal level adjustment. The Baseband Module is wired according to Drawing number 12010046 to accomodate the Repeater option.

1.3 OPTIONS

The following is a list of all options available for use with the TCM-6 Transmitter. See the appropriate DCD in Section 4, Circuit Operation or in the TCM-6 Maintenance Manual for a complete description.

	DCD DRAWING
FM Subcarrier Modulator (narrowband)	12011058
FM Subcarrier Modulator (Wideband)	12011053
Pre-Emphasis Network	12011023 or 12011024
Low Pass Filter (Butterworth)	12011032
Video Elliptical Filter	None
Test Tone Oscillator	12011534
Off-Air Monitor	
Baseband Pre-amp	12011039
De-Emphasis Network	12011025 or 12011026
Baseband Amplifier	12011001
DC Power Supply	12010190
Regulator 5V	12010186
Regulator 15V	12010187
Regulator 28V	12010189
C-Pilot Oscillator	12011616
RF Standby Relay	None (see 12011642)
Video Sync Detector	12011630
Message Amplifier	12010044
Repeater Operation	None

Options (continued)

Fail Alarm Relay	None (see 12011643)
Digital Synthesizer Module	12011647
Programmable Divider	12010040
Frequency Reference and Coarse Tuning	12010042
VCO	12010166
Sample and Hold	12010173
Limiter/Driver Amplifier	12010050
FMR Module	12011600
Demodulator Baseband Insert	12010330
70 MHz FM Demodulator	12011007
Invert/Non Invert Amplifier	12011010
Phase Equalizer	12011022
Low Pass Filter	12011032
Variable Amplitude Equalizer	12011054
70 MHz Limiter	12011598
Biternary Subcarrier Data AGC	12010527
Biternary Subcarrier Modulator	12010528
Biternary Switch	12010573
Biternary Baseband Module (NRZ)	12010984
Biternary Baseband Module (B6ZS/AMI)	12013060

1.4 SPECIFICATIONS

GENERAL - SYSTEM

Frequency Range/Transmitter Power

Model-TCM-	Freq. Range	TX Power	Model-TCM-	Freq. Range	TX Power
601A	1.7-2.1	5W	602C	2.45-2.7	1W
601B	1.95-2.3	5W	602E	3.5-3.9	1W
601C	2.2-2.5	3W	603A	5.925-6.525	1W
602A	3.7-4.2	1W	603B	6.525-6.875	1W
602B	4.4-5.0	1W	603C	6.8-7.2	.75W

Frequency Range/Transmitter Power (continued)

Model-TCM-	Freq. Range	TX Power	Model-TCM-	Freq. Range	TX Power
603D	5.925-6.875	1W	606D	10.7-12.2	.25W
604A	7.125-7.7	.75W	606E	12.2-12.7	.25W
604B	7.7-8.4	.75W	606G	12.7-13.25	.25W
604D	7.125-8.4	.5W	606H	11.7-13.25	.25W
606A	10.7-11.3	.25W	608A	13.8-14.6	.15W
606B	11.3-11.7	.25W	608B	14.4-15.35	.15W
606C	11.7-12.2	.25W			

Capacity	Up to 1800 FDM voice channels, color video with up to two audio program channels or up to 2.048 Mb/s digital subcarrier, up to 35 Mb/s digital data or wideband radar.
Modulation	FM
Deviation	8 MHz peak-to-peak (others optional)
Input Voltage	110 or 220 VAC, 47 to 440 Hz; ±24 VDC or ±48 VDC optional
Environmental	
Temperature Range	-10°C to 50°C recommended -30°C to 70°C operational
Humidity	95% @ 25°C
Altitude	To 4600 meters (15,000 feet)
Dimensions	
Transmitter	41.25 cm (W), 25 cm (H), 30.5 cm (D)*
Receiver	41.25 cm (W), 25 cm (H), 30.5 cm (D)* *16.25" (W), 9.5" (H), 12.0" (D)

Weight	
Transmitter	20.3 kg (45 lbs.), plus options
Receiver	20.3 kg (45 lbs.), plus options
Power Consumption	
Transmitter	80 Watts
Receiver	50 Watts
TRANSMITTER	
Frequency Stability	
Crystal Synthesizer	0.005%
Digital Synthesizer	0.003% to 0.001% (Depends on requirements)
Frequency Control Ref.	Fixed Crystal Oscillator or Digital Synthesizer
Baseband Impedance	75 ohm unbalanced
Baseband Level Control	10 dB range in 1 dB steps, control panel adjust
Type of Tuning	Direct Reading dial
RECEIVER	
Noise Figure	
TCM-601	8.0 dB
TCM-602	8.5 dB
TCM-603	9.5 dB
TCM-604	10.0 dB
TCM-606	11.0 dB
TCM-608	12.0 dB
IF Frequency	70 MHz
IF Bandwidth	30 MHz (5 to 40 MHz optional)
Preselector	Continuous tuning with direct frequency reading, or fixed present
Threshold	-78 dBm (30 MHz IF Bandwidth)

RF Input Level	-20 dBm maximum -30 dBm typical
Frequency Control	Tracking AFC
Type of Tuning	Direct reading dial
AFC Spur Immunity	±7 MHz
AFC Mute	-85 dBm ±5 dB
Baseband Impedance	75 ohm unbalanced
Baseband Level Control	10 dB range in 1 dB steps, control panel adjust

TELEVISION PERFORMANCE

Video Input/Output Level	1.0V peak-to-peak
Tilt	0.7%
Differential Phase	±0.2° (10-90% APL)
Relative Chrominance-Luminance	
Gain	2% maximum
Delay	±20 ns
2T Transient Response	1.5%
Differential Gain	1% (10-90% APL)
K-Factor	1%

Signal-to-Noise (@ -30 dBm Receiver Level)	P-P Signal/RMS Noise	
	EIA Weighted	CCIR Weighted
TCM-601	76 dB	76 dB
TCM-602	74 dB	74 dB
TCM-603	72 dB	72 dB
TCM-604	70 dB	70 dB
TCM-606	68 dB	68 dB
TCM-608	67 dB	67 dB

Signal-to-Hum @ -30 dBm Receiver Level	P-P Signal/RMS Noise EIA Weighted	CCIR Weighted
TCM-601	58 dB	58 dB
TCM-602	58 dB	58 dB
TCM-603	56 dB	56 dB
TCM-604	56 dB	56 dB
TCM-606	54 dB	54 dB
TCM-608	53 dB	53 dB

Response: 0.5 dB, 20 Hz to 20 MHz
3.0 dB, 2 Hz to 15 MHz

Return Loss: 26 dB

Video Clamper (optional): 30 dB min. rejection of 1V p-p 60 Hz interference

MESSAGE PERFORMANCE

Baseband Input Level: -45 dB minimum (with optional amplifier)

Baseband Output Level: -30 dB maximum

Channel Test Tone Deviation: 200 kHz rms up to 960 channels; 140 kHz rms up to 1800 channels

Baseband Response: 3.0 dB 2 Hz 15 MHz

Noise Power Ratio* (worst channel emphasis)	300 CH.	600 CH.	960 CH.	1200 CH.
TCM-601	55	53	48	47
TCM-602	54	52	51	48
TCM-603	53	51	51	50
TCM-604	53	51	49	48
TCM-606	51	49	49	48
TCM-608	50	47	47	47

CCIR standard frequencies; others optional, 3.2-17.0 MHz

* Other Channel loading NPR's available upon request.

FM SUBCARRIER PERFORMANCE

Subcarrier S/N Ratio	Greater than 70 dB (15 kHz B/W)
Subcarrier Frequency	5.8, 6.2, 6.8, 7.5, 8.5 standard, others optional; 4.8-14 MHz
Subcarrier Channel Impedance	600 ohm balanced; 150 ohm balanced; 300 ohm unbalanced; 75 ohm unbalanced
Subcarrier Input Level	0 dB @ Z in
Subcarrier Level Control	10 dB range in 1 dB steps, control panel adjust (xmtr and rcvr)
Subcarrier Channel Response	10 Hz to 15 kHz, 1 dB (with filter) or 10 Hz to 100 kHz, 3 dB (without filter)
Subcarrier Distortion	Less than 1% (10 Hz to 100 kHz)

DATA PERFORMANCE - TCM-610 DATA MODULE

Fixed rate units

Standard Data Rates	1.544 Mb/s AMI
	2.048 Mb/s HDB3
	6.312 Mb/s B6ZS
	8.448 Mb/s HDB3
	12.5526 Mb/s NRZ
	12.928 Mb/s NRZ
Optional Data Rates	Up to 13 Mb/s

Standard Formats

Format	Impedance	"1" Level	"0" Level
NRZ	75 ohm bal	+2V ±.2V	-2V ±.2V
	75 ohm unbal	+2V ±.2V	-2V ±.2V
	75 ohm unbal	TTL Logic Levels	
	50 ohm unbal	0V ±.15V	-1.5V ±.15V
AMI	110 ohm bal	±3V ±.3V	0V ±.3V
B6ZS	110 ohm bal	±4.2V ±.4V	0V ±.4V
HDB3	75 ohm unbal	±2.37V ±.2V	-2.3V ±.2V
	120 ohm unbal	±3V ±.3V	-3V ±.3V

Optional Formats To Be Specified

Switchable Rate Units	
Data Rate	Up to 3 different ratios in each module; rates are harmonics by a factor of two.
Format	NRZ only as per fixed rate units
DATA PERFORMANCE - EXTERNAL MODEM	
Data Rate	Up to 35 Mb/s (consult factory)
Transmitter Bandwidth	Approximately equal to Data Rate (1 Bit/Hz)
Note: Switchable units will occupy bandwidth equal to highest rate	
Monitors	LED indications of data status and unit faults
Necessary Adjustments	None. Units may plugged directly into existing TCM-600 video or FDM systems without adjustments.
Modulation Method	Biternary employing partial response FM
Lock Range	±150 ppm max.
DIGITAL SUBCARRIER PERFORMANCE	
Data Rate	Up to 2.048 Mb/s (partial response signal)
Input/Output Impedance	75 ohms
Input Offset Rejection	>1VDC
Output DC Offset	<.025V into 75 ohms
Output Level	1V p-p
Modulator Monitor	0.75 VDC into 1k ohm @ normal deviation
RF Monitor	-0.3 VDC @ 1k ohm
Demodulator Monitor	-0.75 VDC ±0.1 VDC into 1k ohm

SECTION 2

INSTALLATION

2.1. GENERAL INFORMATION

The TerraCom TCM-6 radio is designed to be installed in a variety of configurations to provide the best possible system application. These instructions cover installation of the radio in either simplex, duplex or multiplex configurations, with either rack or portable mounting. A separate section details the remote installation of the RF head using the optional remoting kit.

The following index lists the topics under which detailed information relating to specific installation procedures may be found.

2.2. INDEX

2.2.1. Antenna Mounting Procedure

(1) Portable Antenna - 2, 4 and 6 ft.

a. Tripod Mount - see Drawing 12014077

b. Pipe Mount - see Drawing 12014074

(2) Pipe Mount Antenna - 4 and 6 ft. - see Drawing 12014046

(3) Pipe Mount Antenna - 8 ft. - see instructions packed with mounting assembly.

2.2.2. Feed Installation - see Antenna Mounting Procedure

2.2.3. Radio Installation - Rack Mount

(1) Simplex - Para. 2.3.1. (1)

(2) Duplex - Para. 2.3.1. (2)

(3) Multiplex - Para. 2.3.1. (3)

2.2.4. Radio Installation - Tripod Mount

(1) Simplex - Para. 2.3.2. (1)

(2) Duplex - Para. 2.3.2. (2)

2.2.5. Remote RF Head Installation

(1) Installation of the remote head - Para. 2.4.1.

(2) Mounting the remote enclosure

a. Tripod, simplex - see Drawing 12014075

b. Tripod, duplex - see Drawing 12014076

c. Pipe Mount - see Drawing 12014002

2.3. RADIO INSTALLATION

2.3.1. Rack Mount

(1) Simplex

For simplex installation, secure the rack mounting brackets (P/N 145-0384) to each side of the unit with #6-32 x 3/8 pan head screws, flat washers and lock washers (16 places).

Install into a standard 19-inch rack with #10-32 panel screws (8 places).

Couple the RF connector to the antenna by using the appropriate length of flexible coaxial cable. Use a UG 57 B/U adaptor and appropriate waveguide to "N" adaptor if required.

(2) Duplex

For duplex installation, secure the rack mount ears on both units as explained in the simplex rack mount instructions (Paragraph 2.3.1. (1)).

Install the transmitter over the receiver in a standard 19" rack with #10-32 panel screws (8 places each unit).

Connect the three-port circulator to the transmitter RF output and receiver RF input using a UG 57 B/U adaptor as shown in Figure 2-1. Either vertical or horizontal entry may be used, but take care to connect the numbered ports as shown in the drawing.

Connect the remaining port of the three-port circulator with coaxial cable and a waveguide to "N" adaptor if required.

If a rack of 3 1/2" wide or more is used, right angle adaptors must be used in making these connections as shown in Figure 2-2.

(3) Multiplex

Install the units in the standard 19" rack using rack mount ears as described in Paragraph 2.3.1.(1).

Various multiplex combinations are possible to meet individual system requirements. Figures 2-3, 2-4 and 2-5 detail the installation of a system using two transmitters and one receiver, or two receivers and one transmitter, with one antenna. Connect the three-port circulators to the radios with UG 57 B/U adaptors as shown in Figure 2-5.

For systems using two transmitters and/or two receivers on a single antenna, see Figures 2-6 and 2-7 for required connections. Note that Figure 2-7 shows the use of hybrid couplers on the transmitter and receiver outputs to achieve maximum isolation.

Figures 2-8 through 2-11 are included in this section as a guide to installation of the TCM-600 radio and options in a standard 19" rack. Figures 2-8 and 2-9 show coaxial and waveguide connections to a single antenna. TerraCom's Hot Standby Switch TCM-HS provides switchover capability between the two transmitters while TerraCom's Baseband Switch TCM-DBS selects the best receiver signal.

For systems using space diversity, Figures 2-10 and 2-11 show the coaxial and waveguide connections to the required two antennas.

2.3.2. Tripod Mount

(1) Simplex

Mount the L-bracket Radio Adaptor (P/N 166-0049) on the L-bracket with the four captive bolts.

Attach four dialatch draw clamps (P/N 119-0136) to the four corners at the base of the radio using four spacers (P/N 145-0103), eight 6-32 x 5/16" Phillips head screws, and eight #6 lock washers.

Set the radio on the L-bracket adaptor so the feet of the unit fit into the slots provided and clamp the unit four places to the base.

Attach flexible coaxial cable (P/N 137-0078) from the antenna feed to the radio's

RF connector.

(2) Duplex

Mount the L-bracket Adaptor (P/N 166-0049) on the L-bracket with the four captive bolts provided.

Attach four dialatch draw clamps (P/N 119-0136) to the four corners at the base of the transmitter and receiver using four spacers (P/N 145-0103), eight 6-32 x 5/16" Phillips head screws and eight #6 lock washers.

Attach four striker places (P/N 145-0104) to the four corners at the top of the transmitter using four spacers (P/N 145-0103), eight 6-32 x 5/16" Phillips head screws, and eight #6 lock washers.

Set the transmitter on the L-bracket with the RF output toward the reflector so that the feet fit into the slots provided, and clamp the unit to the base.

Set the receiver on top of the transmitter with the RF output toward the reflector so that the feet set in the slots on top of the transmitter and clamp the unit to the transmitter.

Using a UG 57 B/U adaptor, connect port one of the three-port circulator to the RF output of the transmitter with port three pointing up toward the receiver as illustrated in Figure 2-12.

Connect the semi-rigid cable (P/N 137-0078) between the receiver RF input port and port three of the circulator.

Using another semi-rigid cable (P/N 137-0078), connect port two of the circulator to the waveguide adaptor on the rear of the antenna feed.

2.4 REMOTE RF HEAD INSTALLATION

2.4.1. Installing the RF Module

The RF module contained in the TCM-6 radio may be installed in a weather tight enclosure and mounted at the antenna site for remote operation. To do this, the RF module must be removed from the radio and replaced with a remote patch cord. The RF module can then be installed in the remote enclosure and connected to the antenna. This can be easily accomplished by following these step-by-step

instructions:

See Figure 2-13 for the following steps:

Remove the RF connector (1) from the side of the radio enclosure by removing the four 4-40 x 3/8 pan head screws and unscrewing the connector counterclockwise. This connector will later be installed in the remote enclosure.

Remove the RF Head (2) by loosening the captive screws top and bottom and sliding the module straight out.

Remove the RF connector adapter gasket (3) by removing its four screws and taking it out from inside the enclosure. These two parts are not used for remoting but must be retained if local operation is to be resumed.

See Figure 2-14 for the following steps: (picture shown is receiver--operation is the same for the transmitter).

Install the Remote Enclosure Patch Cord (P/N 137-0088) inside the radio RF enclosure by first putting the twenty-five pin connector (1) through the side connector hole (it must be turned sideways to fit through) and then plugging it into the rear web assembly. The sixteen pin remote cable connector (2) and gasket can then be mounted in the side connector hole with four screws.

Remove the RF module cover from the remote enclosure. Attach the three loose wires on the Remote Enclosure Patch Cord (installed in previous step) to the terminals of the phone jack located on the module cover (3). Be sure to observe the wiring color code on the back of the cover. Install the RF module cover on the front of the radio and tighten the captive screws.

See Figure 2-15 for the following steps:

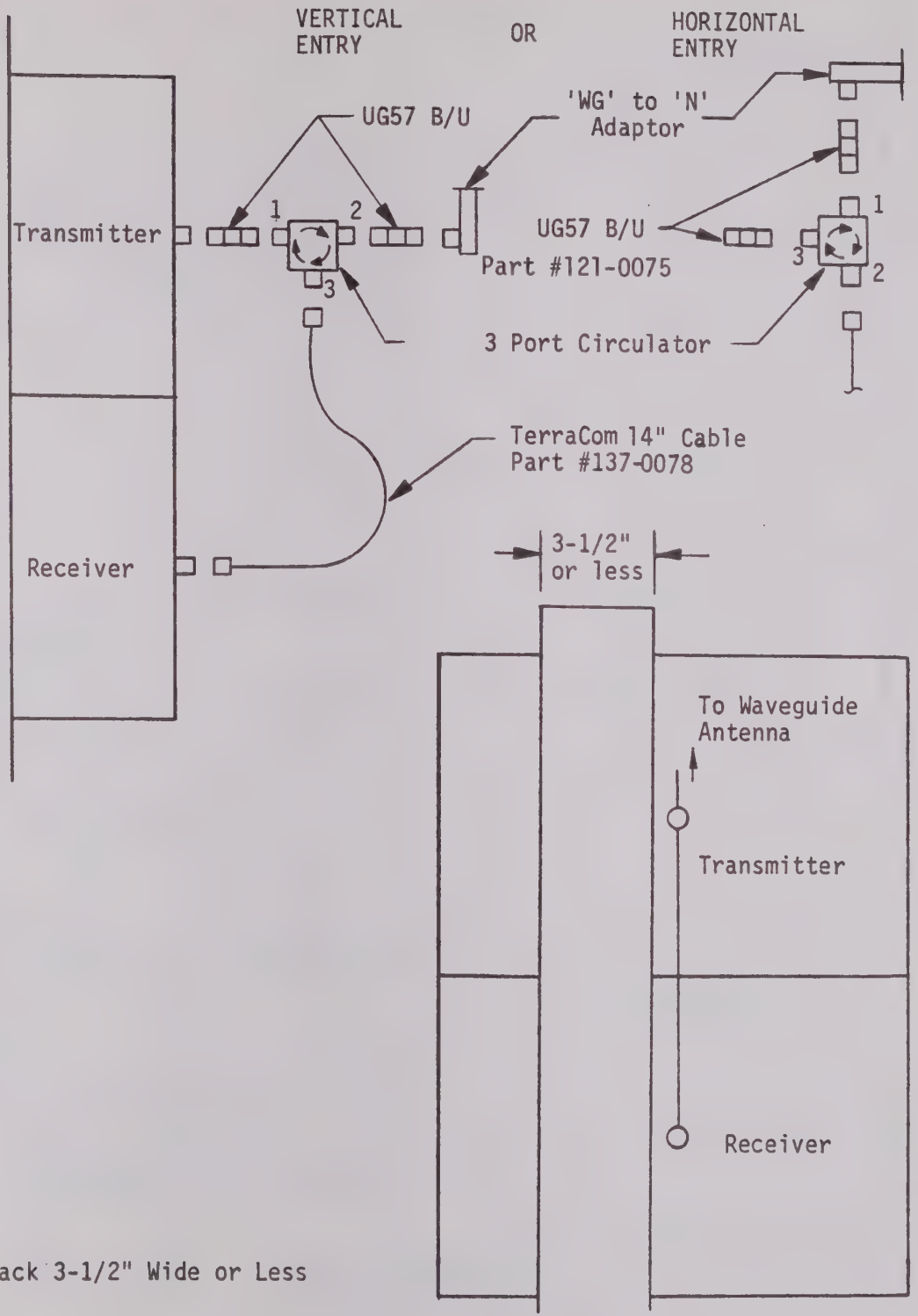
Remove the small cover located on the left side of the remote enclosure front panel (1). (Figure shown with cover removed). The 100 MHz Limiter-Driver amplifier (P/N 12010050) must be installed on the standoffs located under the cover.

Position the amplifier PC board so that the -15VDC (green to E7) and ground (black to E4) connectors (2) can be reached by the wires protruding from the front panel of the remote enclosure.

Attach the red coded wire to the board's output terminal (3) and the black coded wire to the input terminal (4). Replace the cover on the PC board.

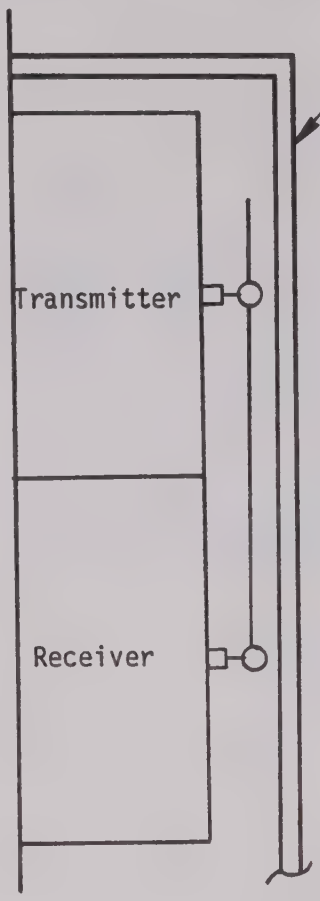
Insert the RF module into the remote enclosure and tighten the captive screws. Install the RF output connector (this was removed from the radio enclosure) on the side of the remote unit with four screws. It may be necessary to loosen the four screws holding the mounting plate to position the center hole correctly.

Check the setting of the U-links on the Variable Amplitude Equalizer (12011054) in the Baseband Module (or optional FMR Module). The U-links should be plugged into the terminals corresponding to the length of the remote cable being used. (Cable lengths are indicated in feet).

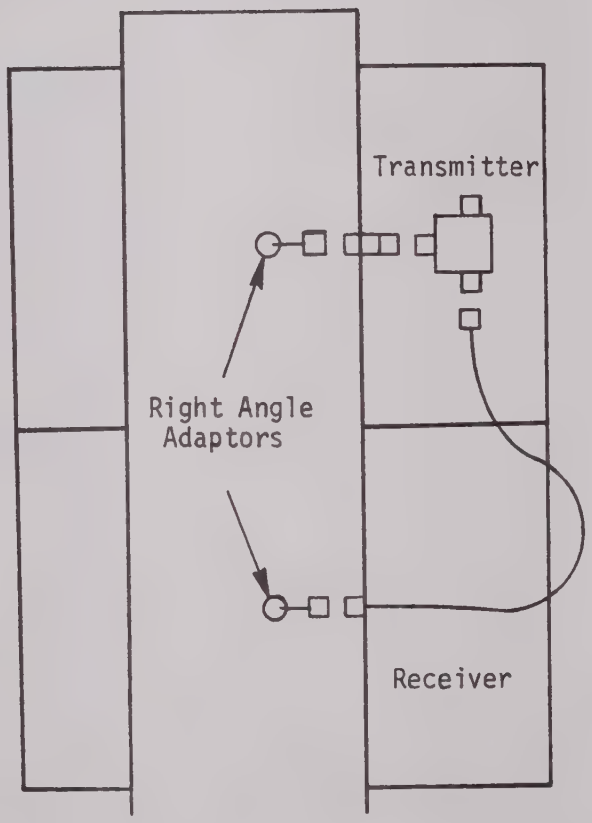


RACK MOUNT DUPLEXING (2 RADIOS)

FIGURE 2-1



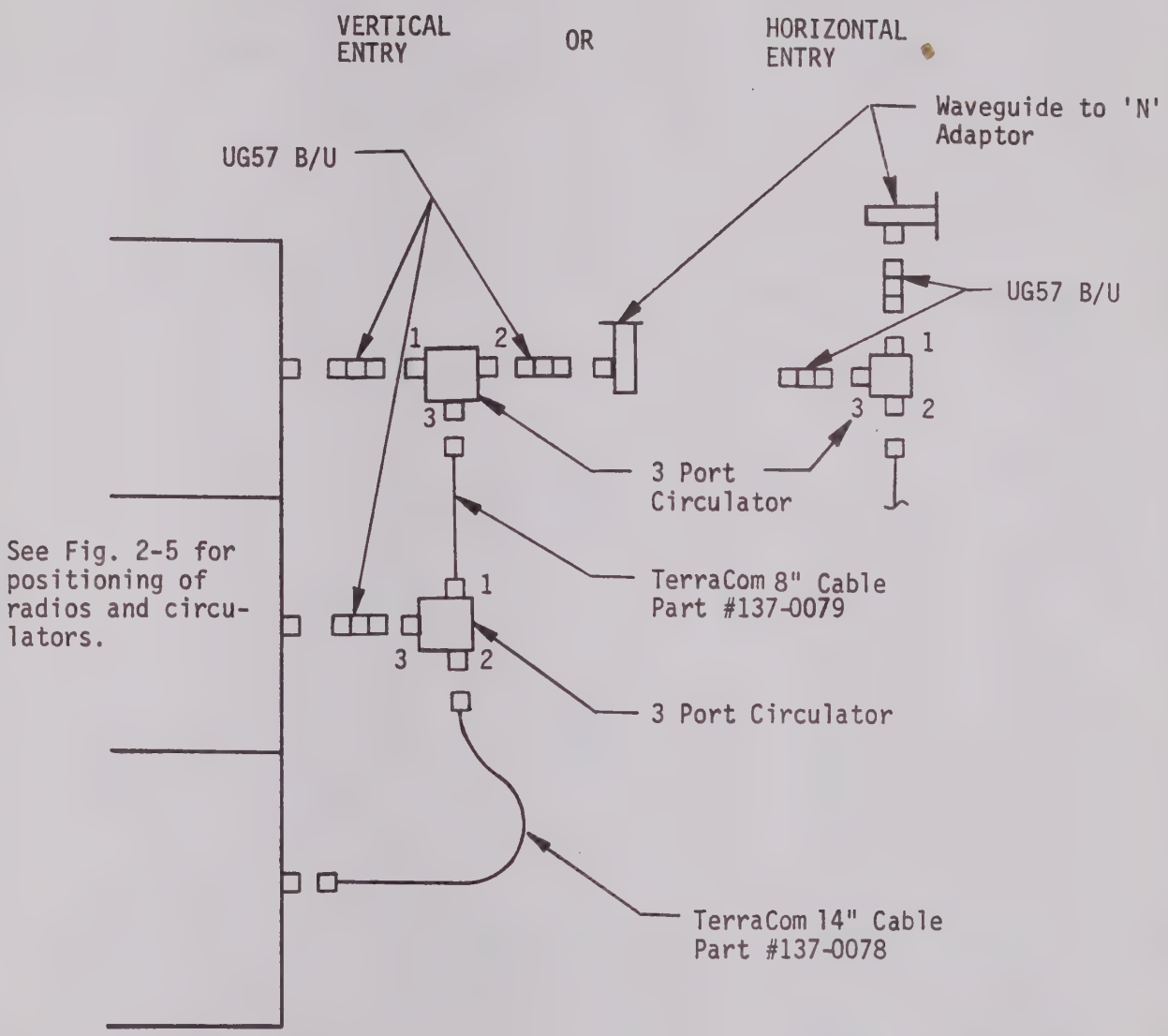
Cables and Connectors are the same as Figure 4.2 with the addition of 2 'N' male to 'N' female right angle adaptors, TerraCom Part #121-0048. This lays the cable assy. against the radio.



Rack 3-1/2" Wide or Wider

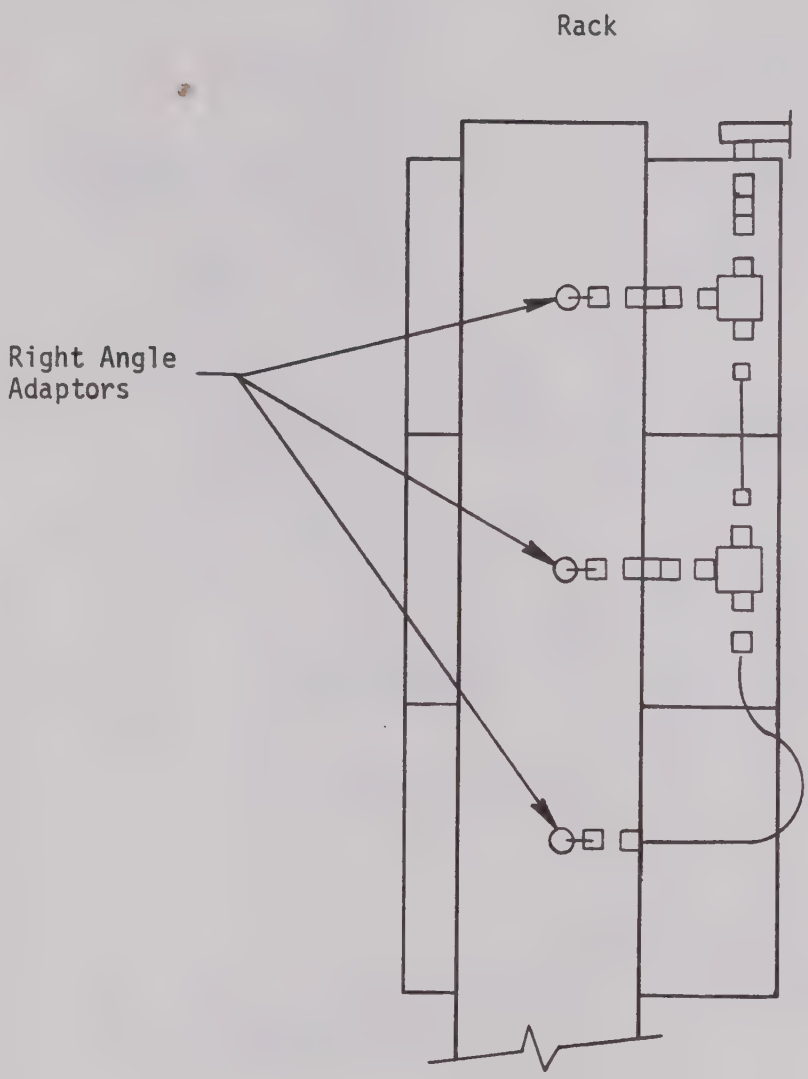
RACK MOUNTING DUPLEXING (2 RADIOS)

FIGURE 2-2



RACK MOUNTING MULTIPLEXING

FIGURE 2-3

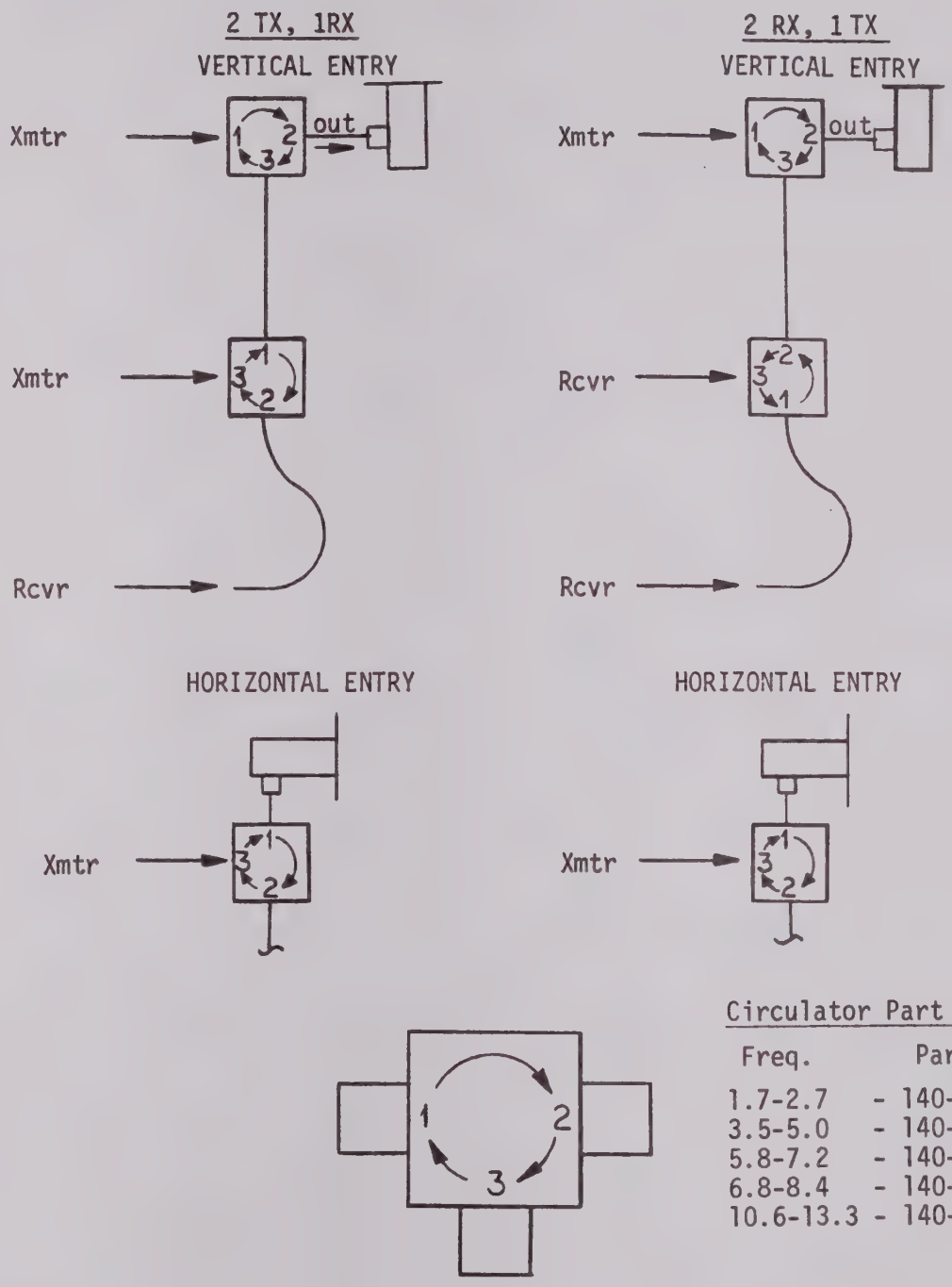


Cable and Connectors are the same as Figure 2-3 with the addition of 3 'N' male to 'N' female right angle adaptors, TerraCom Part #121-0048. This lays the cable assy. against the radios.

Rack 3-1/2" Wide or More.

RACK MOUNTING MULTIPLEXING

FIGURE 2-4

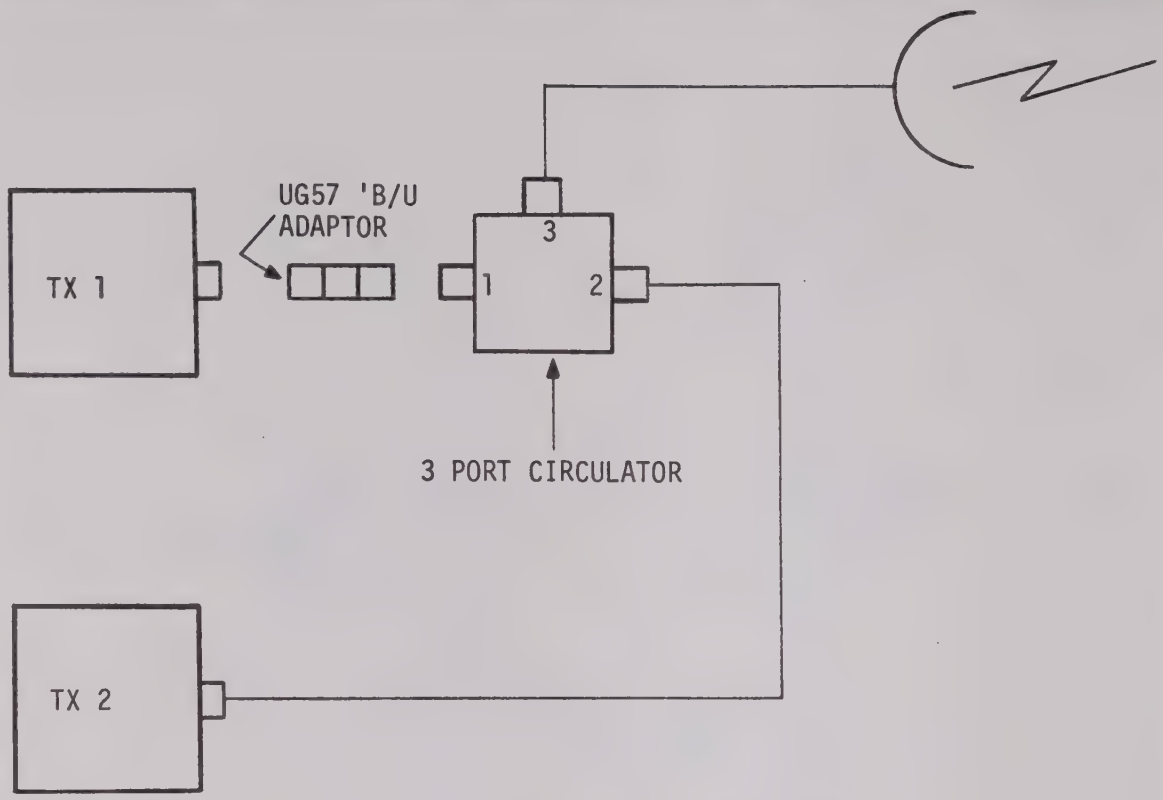


Circulator Part #'s

Freq.	Part #
1.7-2.7	- 140-0058
3.5-5.0	- 140-0046
5.8-7.2	- 140-0072
6.8-8.4	- 140-0041
10.6-13.3	- 140-0073

MULTIPLEXING CIRCULAR CONFIGURATIONS

FIGURE 2-5


UG57 'B/U
ADAPTOR
TX 1
3
1
2
3 PORT CIRCULATOR
TX 2

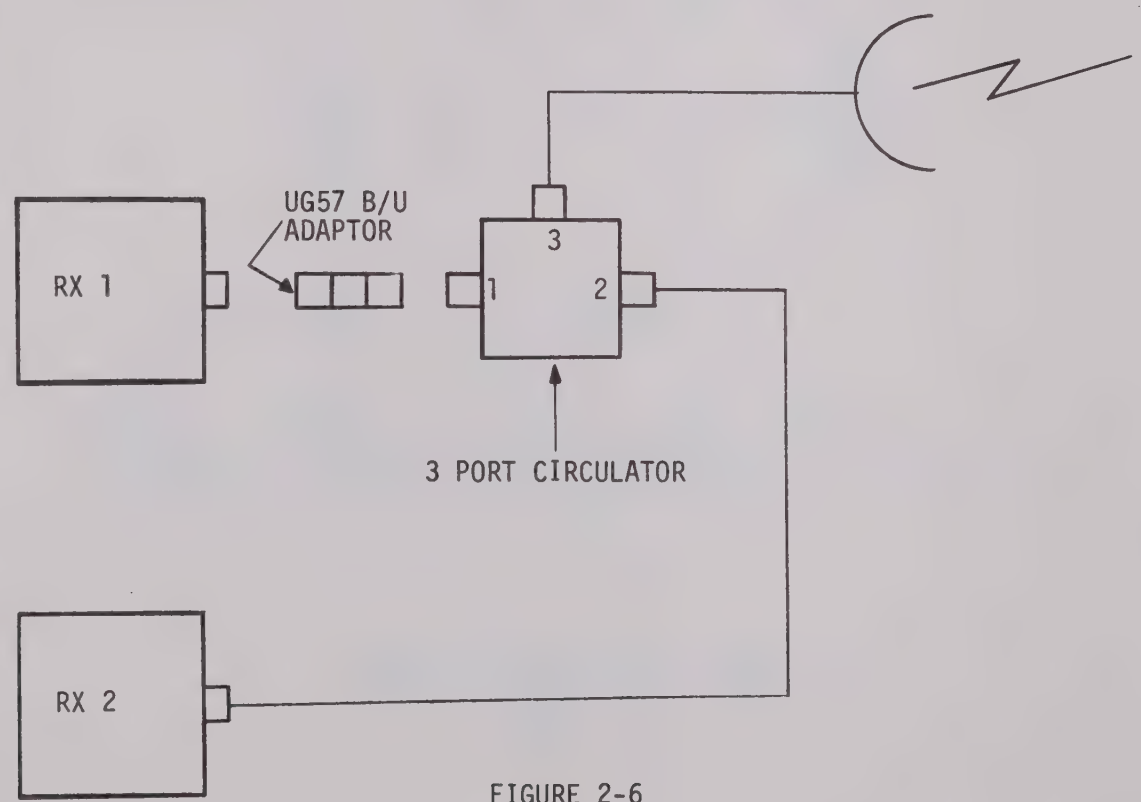

UG57 B/U
ADAPTOR
RX 1
3
1
2
3 PORT CIRCULATOR
RX 2

FIGURE 2-6

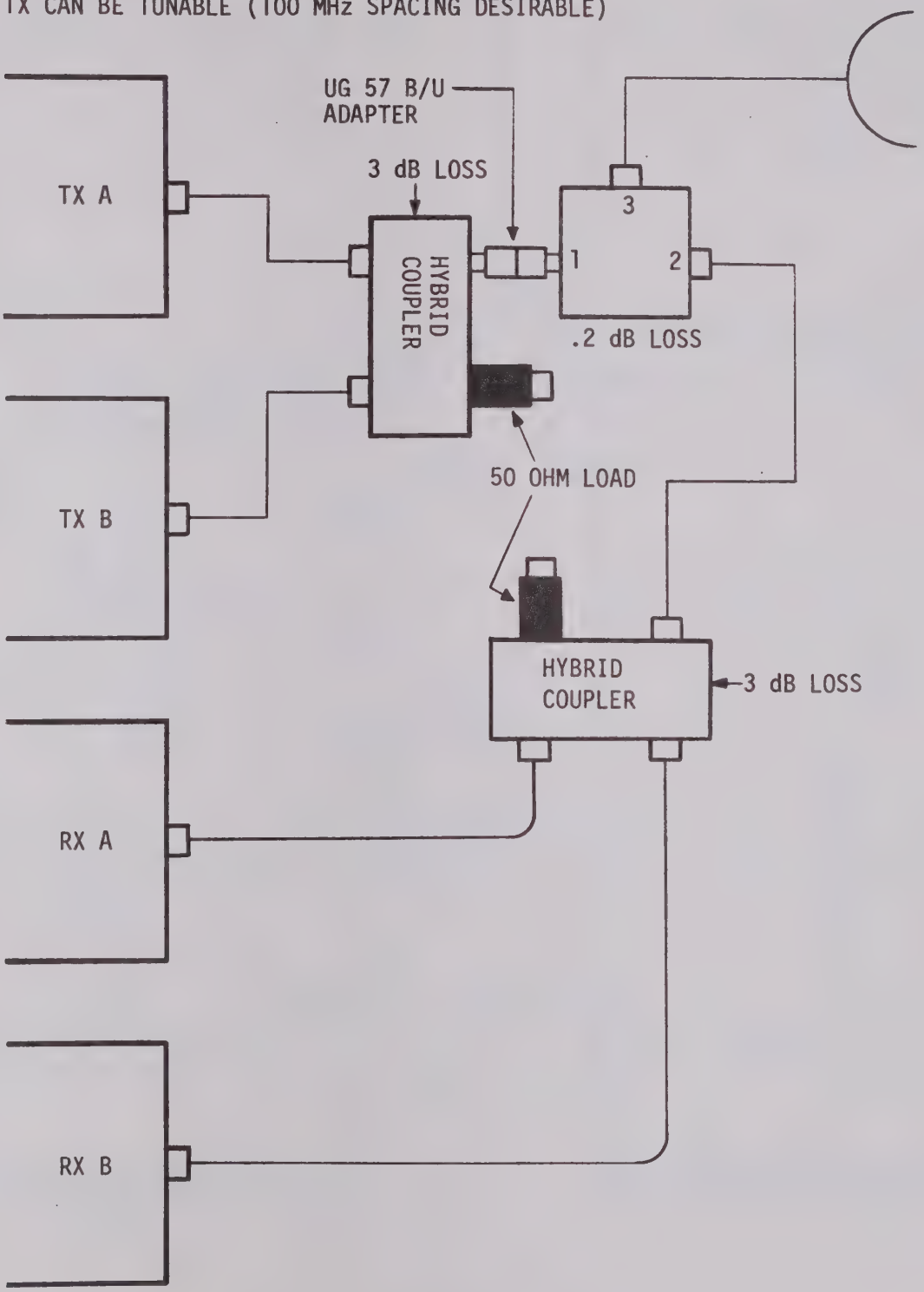

TX CAN BE TUNABLE (100 MHz SPACING DESIRABLE)
UG 57 B/U
ADAPTER
3 dB LOSS
TX A
HYBRID
COUPLER
3
1
2
.2 dB LOSS
TX B
50 OHM LOAD
HYBRID
COUPLER
3 dB LOSS
RX A
RX B

FIGURE 2-7

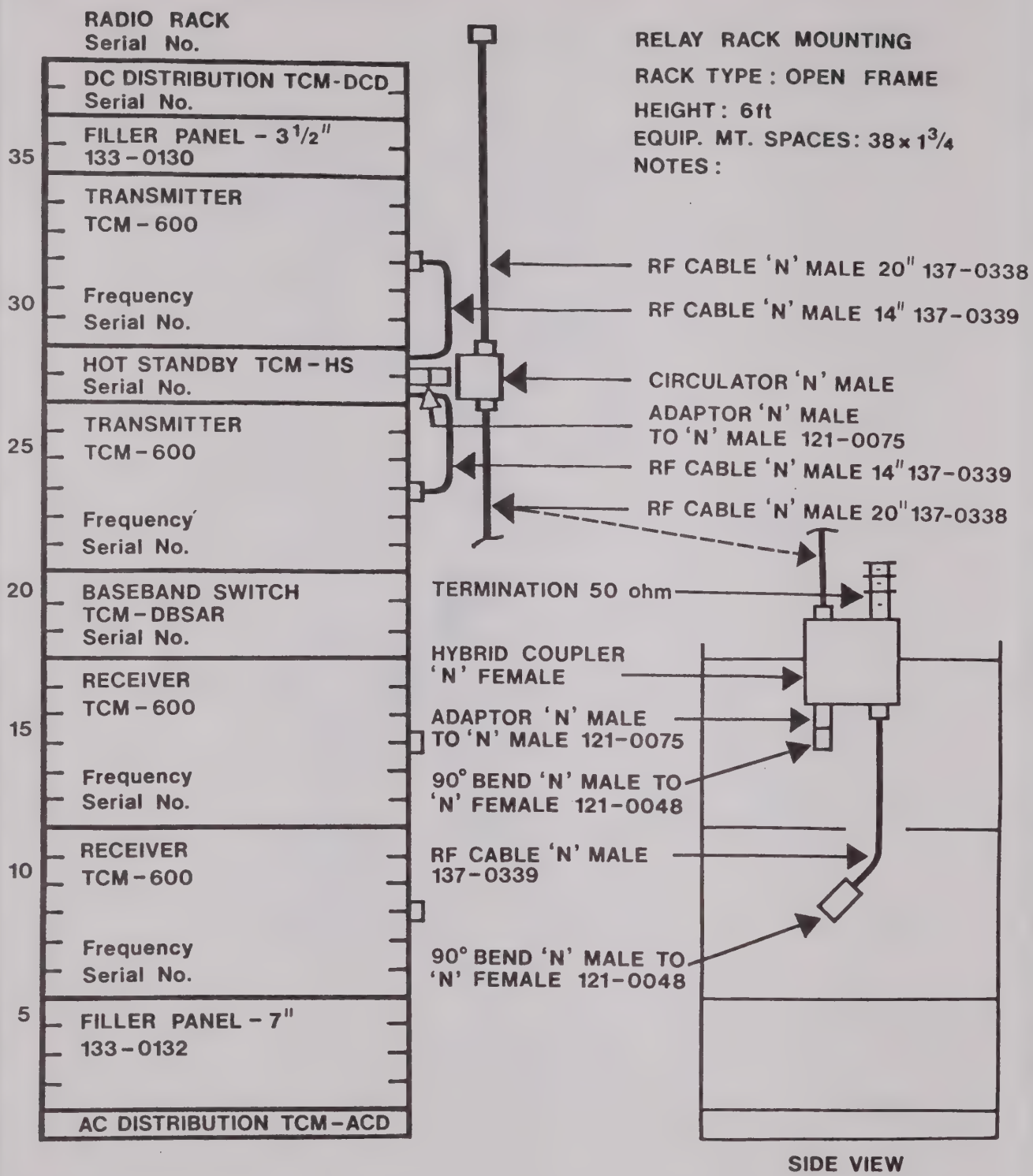

RADIO RACK
Serial No.
DC DISTRIBUTION TCM-DCD
Serial No.
FILLER PANEL - 3 1/2"
133-0130
TRANSMITTER
TCM-600
Frequency
Serial No.
HOT STANDBY TCM-HS
Serial No.
TRANSMITTER
TCM-600
Frequency
Serial No.
BASEBAND SWITCH
TCM-DBSAR
Serial No.
RECEIVER
TCM-600
Frequency
Serial No.
RECEIVER
TCM-600
Frequency
Serial No.
FILLER PANEL - 7"
133-0132
AC DISTRIBUTION TCM-ACD
35
30
25
20
15
10
5
RELAY RACK MOUNTING
RACK TYPE: OPEN FRAME
HEIGHT: 6ft
EQUIP. MT. SPACES: 38 x 1 3/4
NOTES:
RF CABLE 'N' MALE 20" 137-0338
RF CABLE 'N' MALE 14" 137-0339
CIRCULATOR 'N' MALE
ADAPTOR 'N' MALE
TO 'N' MALE 121-0075
RF CABLE 'N' MALE 14" 137-0339
RF CABLE 'N' MALE 20" 137-0338
TERMINATION 50 ohm
HYBRID COUPLER
'N' FEMALE
ADAPTOR 'N' MALE
TO 'N' MALE 121-0075
90° BEND 'N' MALE TO
'N' FEMALE 121-0048
RF CABLE 'N' MALE
137-0339
90° BEND 'N' MALE TO
'N' FEMALE 121-0048
SIDE VIEW

FIGURE 2-8

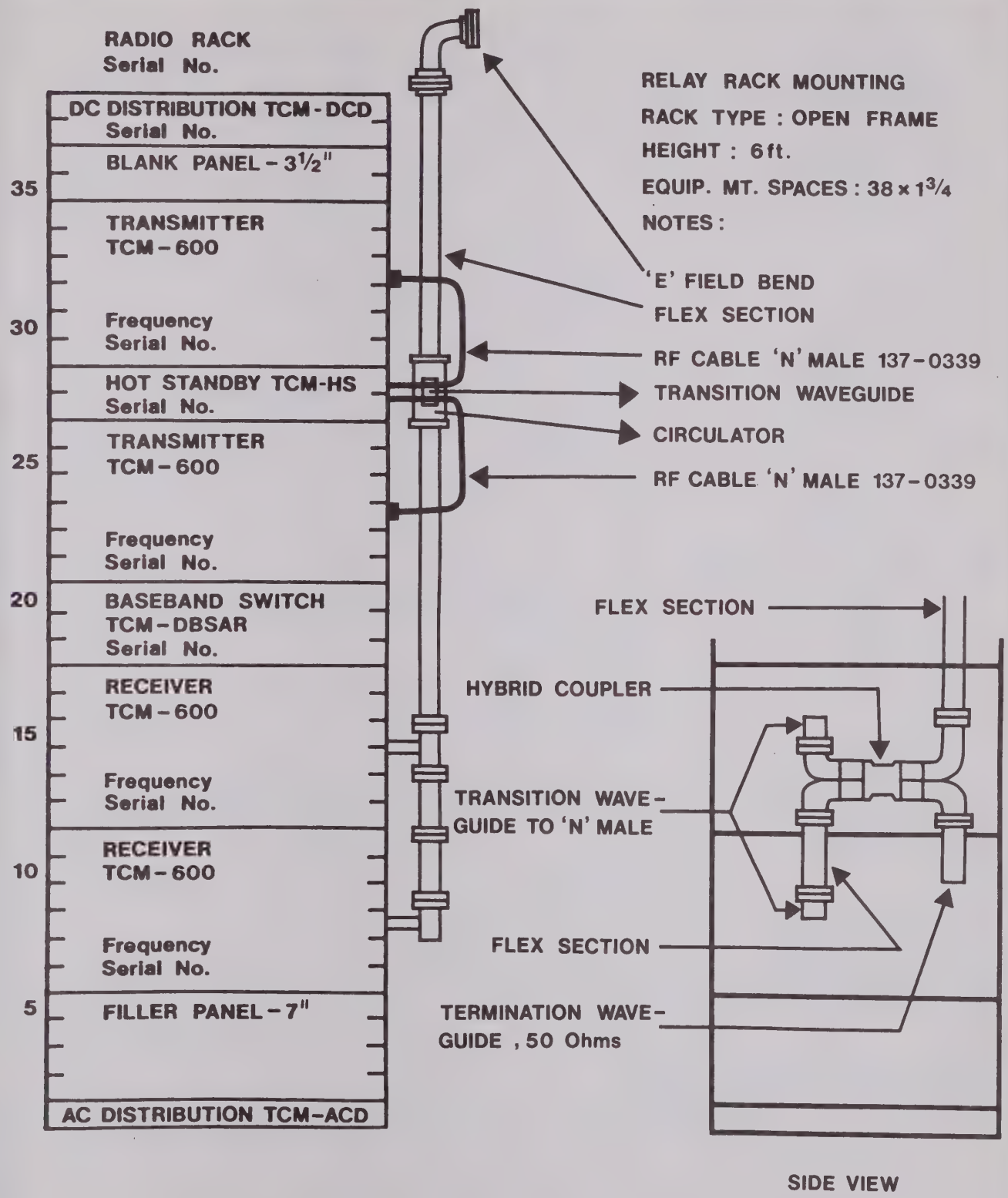

RADIO RACK
Serial No.
DC DISTRIBUTION TCM-DCD
Serial No.
BLANK PANEL – 3½"
35
TRANSMITTER
TCM – 600
Frequency
Serial No.
30
HOT STANDBY TCM-HS
Serial No.
TRANSMITTER
TCM – 600
25
Frequency
Serial No.
20
BASEBAND SWITCH
TCM – DBSAR
Serial No.
RECEIVER
TCM – 600
15
Frequency
Serial No.
RECEIVER
TCM – 600
10
Frequency
Serial No.
5
FILLER PANEL – 7"
AC DISTRIBUTION TCM-ACD
RELAY RACK MOUNTING
RACK TYPE : OPEN FRAME
HEIGHT : 6ft.
EQUIP. MT. SPACES : 38 x 1¾
NOTES :
'E' FIELD BEND
FLEX SECTION
RF CABLE 'N' MALE 137-0339
TRANSITION WAVEGUIDE
CIRCULATOR
RF CABLE 'N' MALE 137-0339
FLEX SECTION
HYBRID COUPLER
TRANSITION WAVE-
GUIDE TO 'N' MALE
FLEX SECTION
TERMINATION WAVE-
GUIDE , 50 Ohms
SIDE VIEW

FIGURE 2-9

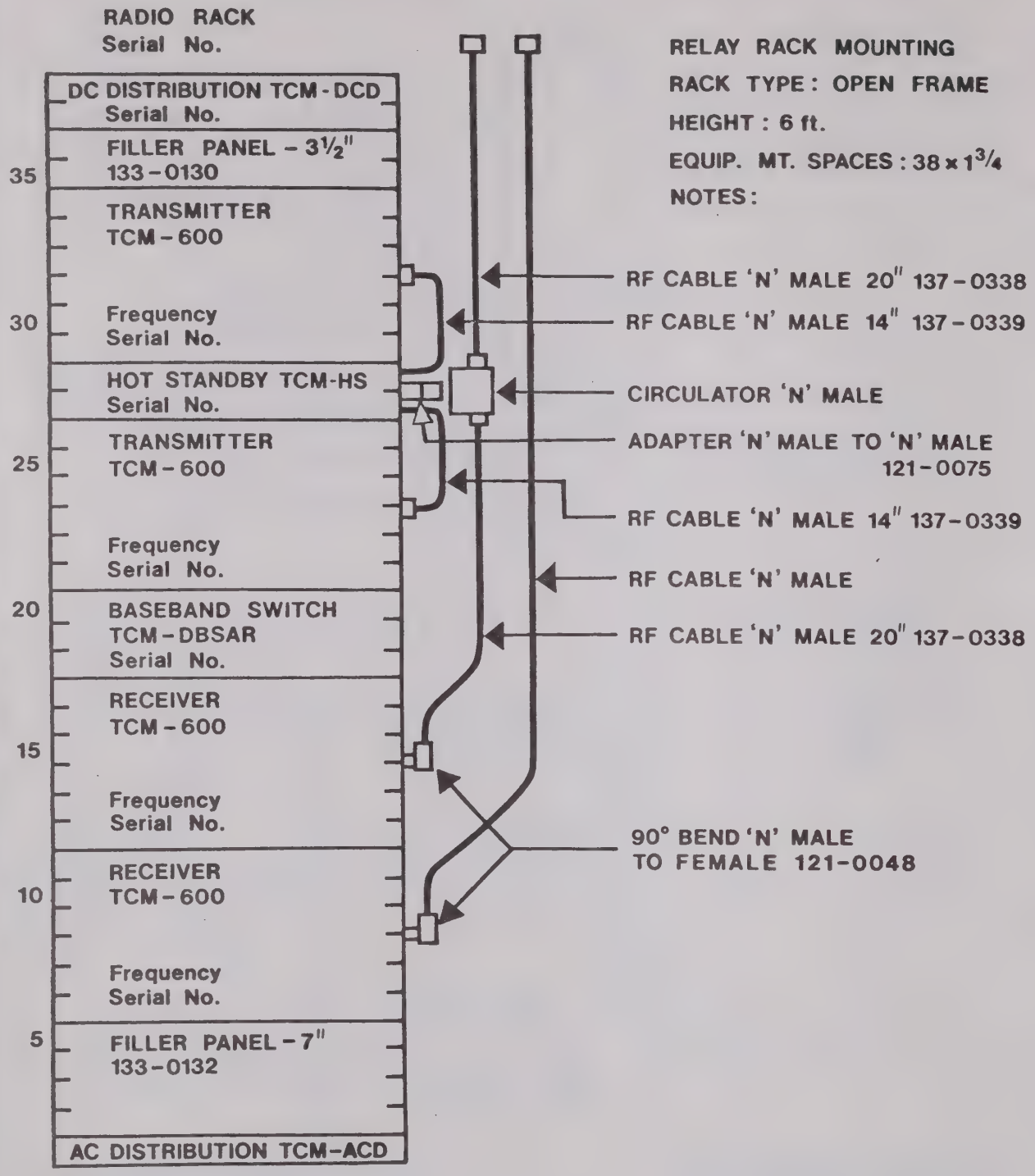

RADIO RACK
Serial No.
DC DISTRIBUTION TCM-DCD
Serial No.
FILLER PANEL - 3½"
133-0130
35
TRANSMITTER
TCM-600
30
Frequency
Serial No.
HOT STANDBY TCM-HS
Serial No.
TRANSMITTER
TCM-600
25
Frequency
Serial No.
20
BASEBAND SWITCH
TCM-DBSAR
Serial No.
RECEIVER
TCM-600
15
Frequency
Serial No.
RECEIVER
TCM-600
10
Frequency
Serial No.
5
FILLER PANEL - 7"
133-0132
AC DISTRIBUTION TCM-ACD
RELAY RACK MOUNTING
RACK TYPE: OPEN FRAME
HEIGHT: 6 ft.
EQUIP. MT. SPACES: 38 x 1 3/4
NOTES:
RF CABLE 'N' MALE 20" 137-0338
RF CABLE 'N' MALE 14" 137-0339
CIRCULATOR 'N' MALE
ADAPTER 'N' MALE TO 'N' MALE
121-0075
RF CABLE 'N' MALE 14" 137-0339
RF CABLE 'N' MALE
RF CABLE 'N' MALE 20" 137-0338
90° BEND 'N' MALE
TO FEMALE 121-0048

FIGURE 2-10

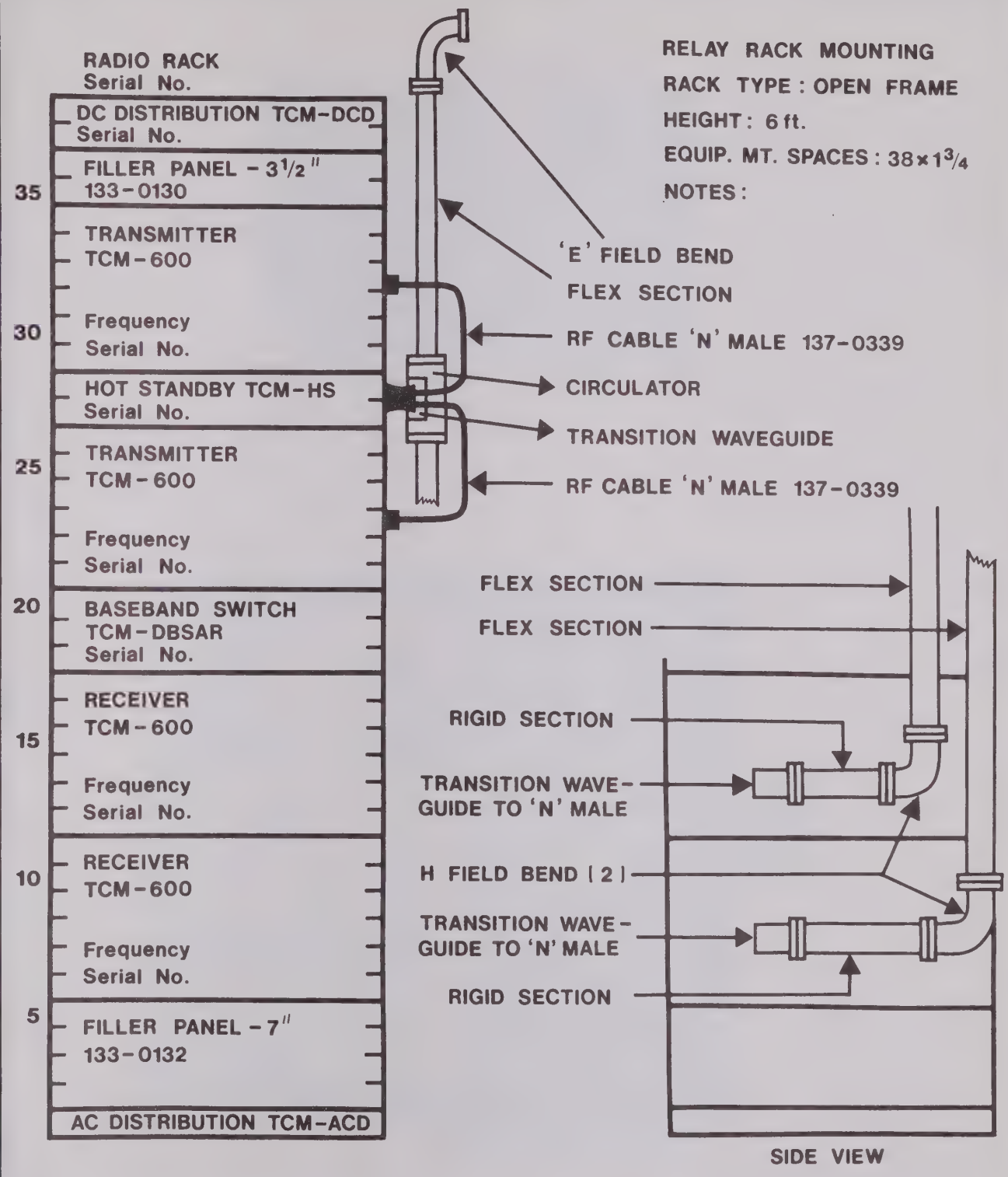
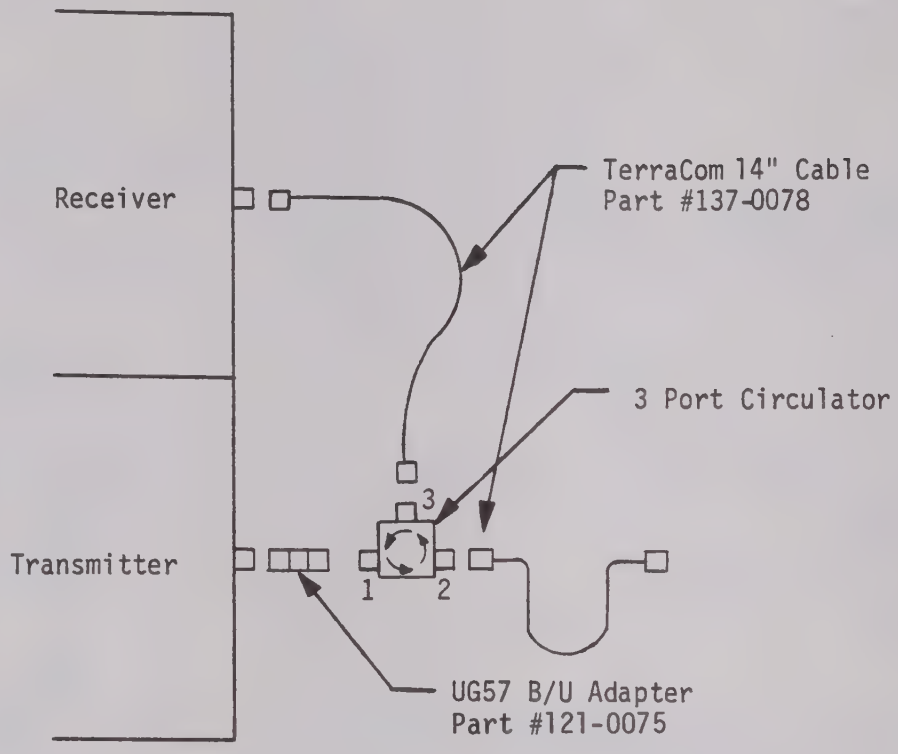

RADIO RACK
Serial No.
DC DISTRIBUTION TCM-DCD
Serial No.
FILLER PANEL - 3 1/2"
133-0130
35
TRANSMITTER
TCM-600
Frequency
Serial No.
30
HOT STANDBY TCM-HS
Serial No.
TRANSMITTER
TCM-600
25
Frequency
Serial No.
BASEBAND SWITCH
TCM-DBSAR
Serial No.
20
RECEIVER
TCM-600
15
Frequency
Serial No.
RECEIVER
TCM-600
10
Frequency
Serial No.
FILLER PANEL - 7"
133-0132
5
AC DISTRIBUTION TCM-ACD
RELAY RACK MOUNTING
RACK TYPE : OPEN FRAME
HEIGHT : 6 ft.
EQUIP. MT. SPACES : 38 x 1 3/4
NOTES :
'E' FIELD BEND
FLEX SECTION
RF CABLE 'N' MALE 137-0339
CIRCULATOR
TRANSITION WAVEGUIDE
RF CABLE 'N' MALE 137-0339
FLEX SECTION
FLEX SECTION
RIGID SECTION
TRANSITION WAVE-
GUIDE TO 'N' MALE
H FIELD BEND (2)
TRANSITION WAVE-
GUIDE TO 'N' MALE
RIGID SECTION
SIDE VIEW

FIGURE 2-11



TRIPOD DUPLEX

FIGURE 2-12

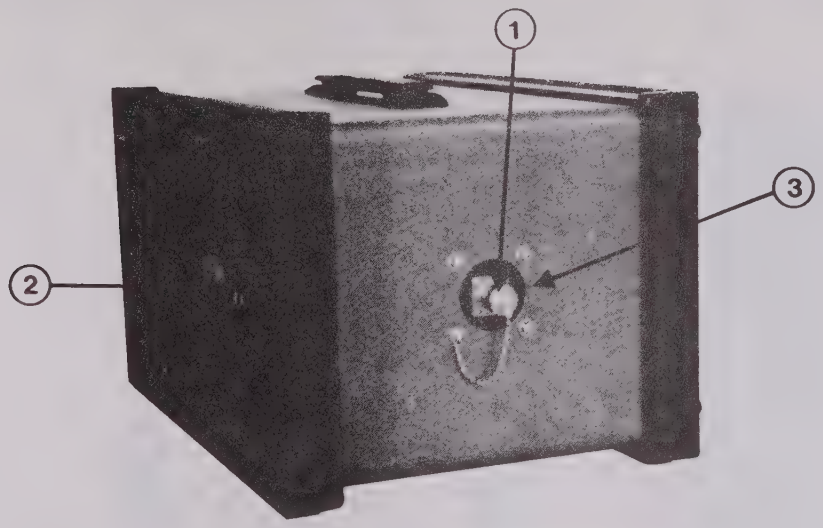


FIGURE 2-13

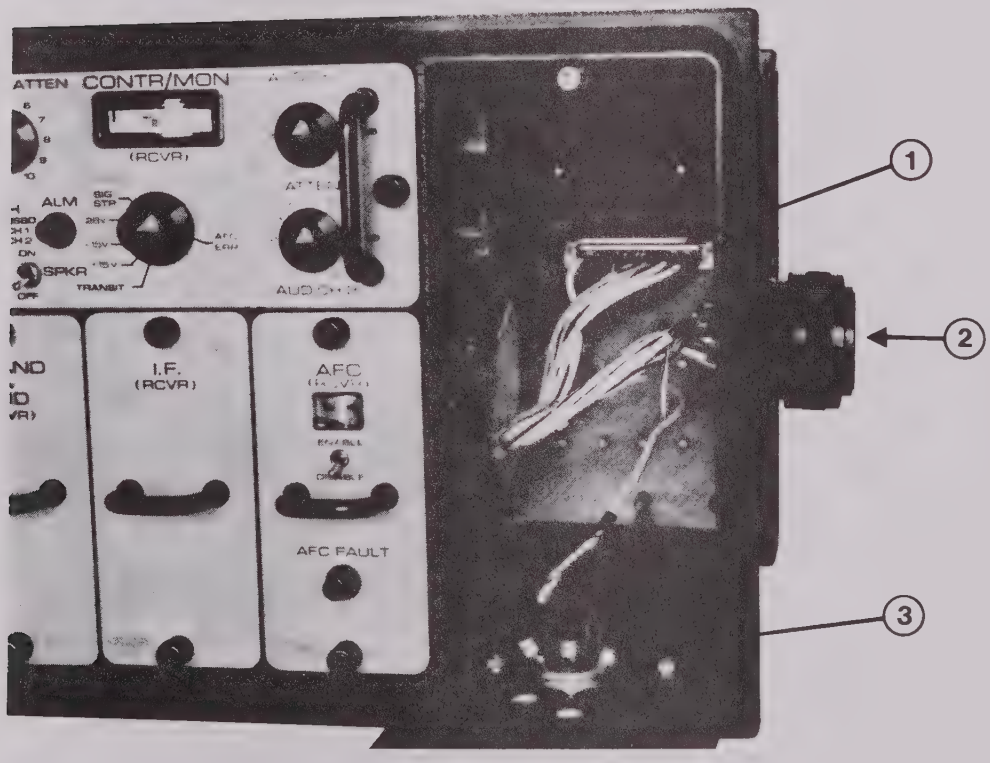


FIGURE 2-14

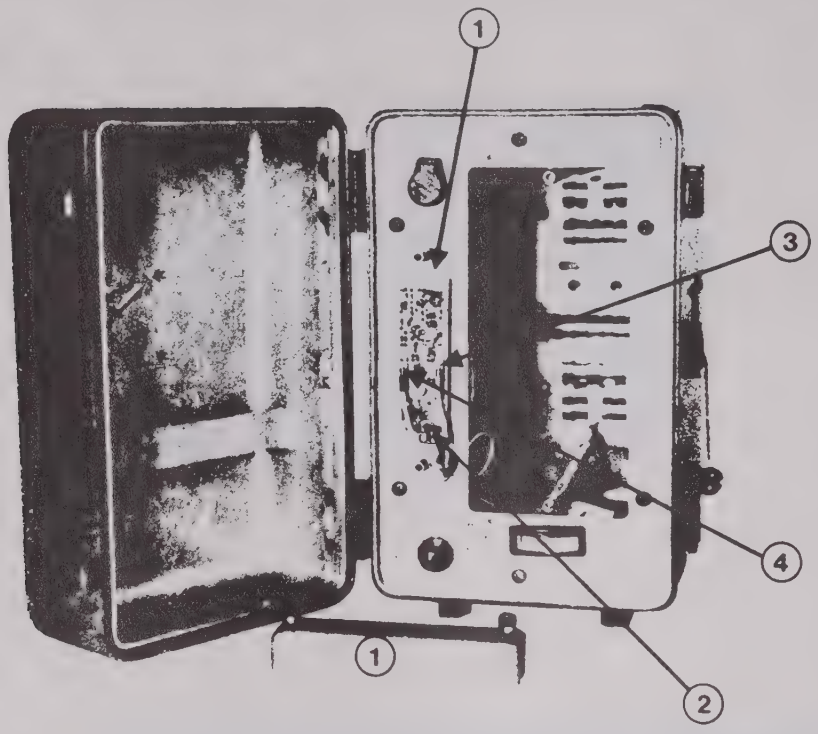
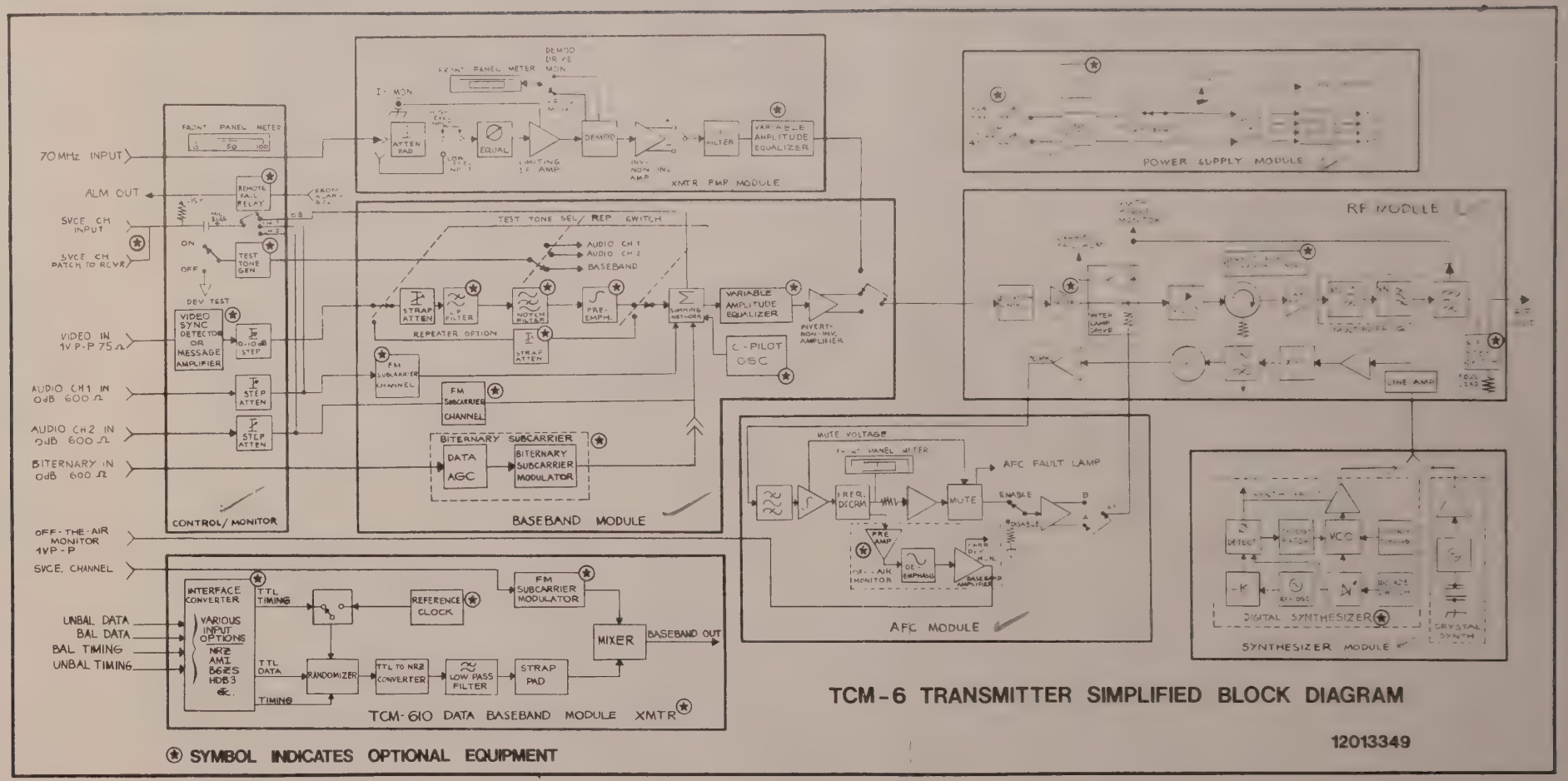


FIGURE 2-15



TCM-6 TRANSMITTER SIMPLIFIED BLOCK DIAGRAM

12013349

★ SYMBOL INDICATES OPTIONAL EQUIPMENT

SECTION 3

OPERATING INSTRUCTIONS

3.3. CONTROLS/INDICATORS/CONNECTORS

See Figure 3-1, Front Panel

1. Power Supply Circuit Breaker provides circuit overload protection.
2. Pilot Light indicates power supply on.
3. Power Supply Fault Light provides a visual indication of power failure or excessive current drain.
4. Baseband Attenuator (10 dB in 1 dB steps) permits adjustment of Baseband signal level. Maximum deviation occurs at 0 dB setting and rated deviation (4 MHz peak) occurs at 5 dB.
5. RF Standby Switch allows the RF output to be switched to an internal load for testing (optional). In the Auto position, switching is controlled by the Video Presence Detector (optional).
6. Master Fail Alarm gives a visual indication of failure in SYNTH, AFC, RF, PWR SPLY, or DEV TEST switch on.
7. Deviation Test Switch is provided to turn the Test Tone Oscillator on or off.
8. Transmitter Monitor Meter is provided to monitor regulated supply voltages and all critical signal levels.
9. Monitor Selector Switch controls meter input.
10. Audio Channel 1 Attenuator permits adjustment of subcarrier input signal level (10 dB in 1 dB steps). This attenuator is supplied but is not used unless the subcarrier option is ordered. Normal deviation (100 kHz peak) occurs at 0 dB setting.
11. Audio Channel 2 Attenuator same as Audio Channel 1.
12. Synth Fault Light provides a visual indication of faulty circuits in the

crystal oscillator or no output from the Synthesizer Module.

13. AFC Meter indicates proper adjustment of the VCO to allow AFC lock up (normally centered).

14. AFC Enable/Disable Switch allows the frequency of the VCO to be adjusted free of AFC control.

15. AFC Fault Light indicates out-of-lock condition of the AFC.

16. RF Output Frequency Control permits adjustment of the output frequency within the range indicated on the calibrated tape.

17. Carrier Fault Light indicates RF output level is low (6 dB below normal).

18. RF Output Connector (not shown). RF output signal is taken from the transmitter by means of this "N" type connector. NOTE: Connector must be removed before removing the RF Module from the enclosure assembly.

19. Test Tone/Repeater Selector Switch in the Test Tone position places test tone on Baseband or either subcarrier channel; in the REP position bypasses frequency shaping elements to function as a repeater.

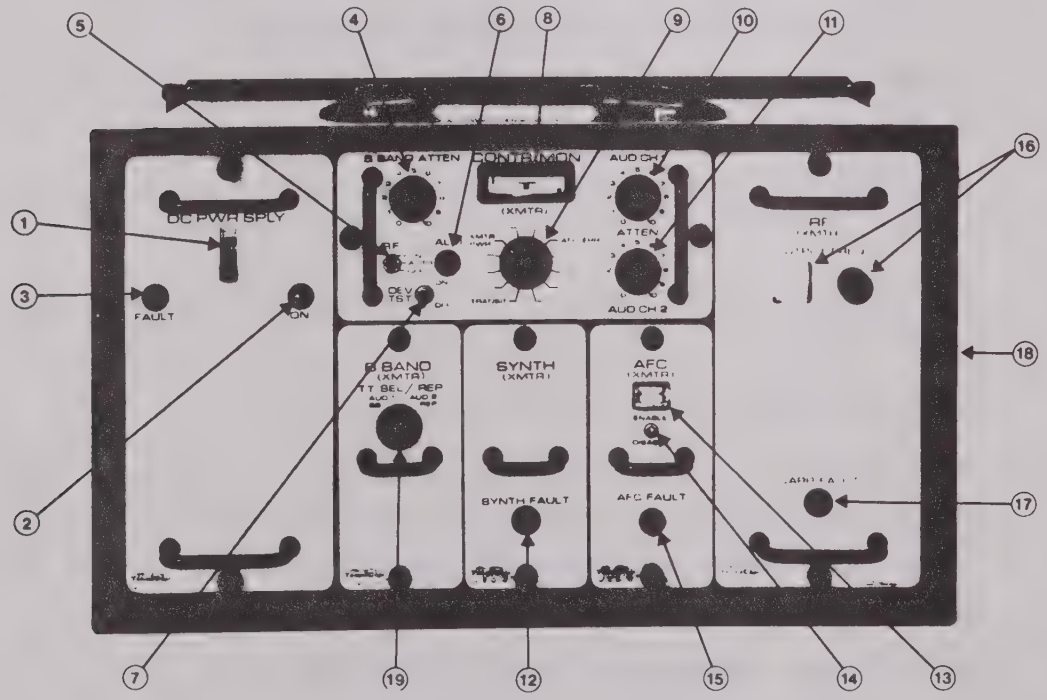


Figure 3-1
Front Panel

See Figure 3-2, Rear Panel

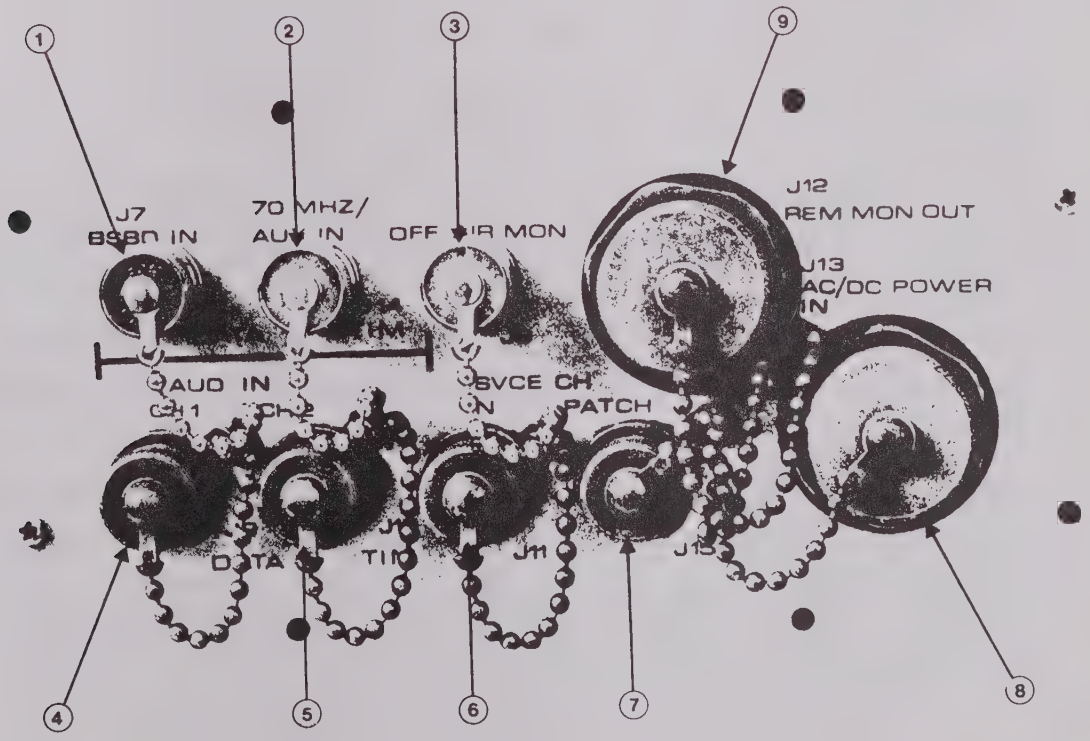
1. Baseband Input BNC type connector. Input levels are up to 1.0 volt p-p and frequencies from 2 Hz to 15 MHz (depending on options). Input impedance is 75 ohms unbalanced.

2. 70 MHz Aux Input BNC type connector. Used with the FMR Module for interfacing with a receiver at 70 MHz.

3. Off-Air Monitor BNC type connector. Output level corresponds to the baseband input level. Output impedance is 75 ohms.

4. Audio Channel 1 Input Burndy Solder Bantam connector (BT07E8-3SW). Normal input level is 0 dB/Zin (2.2V p-p/600 ohm). Normal input impedance (audio frequencies) is 60C ohm balanced.

5. Audio Channel 2 Input Burndy Solder Bantam connector (BT07E8-3S). Normal input level is 0 dB/Zin (2.2V p-p/600). Normal input impedance (audio frequencies) is 600 ohm balanced.



6. Service Channel Input Burndy Solder Bantam connector (BTO7E8-4S). Current is supplied for a carbon microphone hand set and audio from the receiver in duplex operation for the earphone.

7. Service Channel Patch Receiver Burndy Solder Bantam connector (BTO7E8-4S). This connector is used in conjunction with an external cable and head set in duplex operation (or as a microphone input in simplex operation) allowing the baseband or subcarrier channels to be used for voice transmission.

8. 110V AC Power Input Burndy Solder Bantam connector (BTO7E14-5P). 220V AC 47 to 440 Hz operation is standard. ±24 and ±48V DC operation is optional.

9. Remote Monitor Out Burndy Solder Bantam connector (BTO7E14-5P). This connector is used to provide remote indications of transmitter parameters.

3.2. TRANSMITTER TURN-ON- (Standard configuration - RF Head Not Remoted)

1. If the optional Variable Amplitude Equalizer has been installed (located in the Baseband Module), assure that the U-links are set at the zero feet positions (E2 to E14 and E13 to E15). Unless otherwise requested, the radio will be supplied with this setting.

2. Assure that the transmitter inputs are correctly patched (both baseband and audio). See Figure 3-2, Rear Panel.

3. Insert the desired crystal in the Synthesizer Module (see Table 3-1). If a digital synthesizer is used, set the thumbwheel switch to the proper frequency settings (see chart attached to the side of the Synthesizer Module for thumbwheel settings, or use the formula given in table 3-1 to determine frequency). Switches are located inside the Synthesizer Module.

4. Turn the Power Supply circuit breaker to ON. The Power Supply ON lamp should illuminate and the Power Supply FAULT lamp should be off. The Synthesizer FAULT lamp should extinguish within five seconds. The AFC FAULT lamp may not extinguish until transmitter tuning has been performed. (see Paragraph 3.4.).

5. With the DEVIATION TEST switch to ON and the Baseband input terminated in 75 ohms, check the following Control Monitor meter reading; (The FAULT lamp on the Control Monitor will be illuminated while the DEVIATION TEST switch is on).

Parameter	Meter Zone
+15 VDC	Green
-15 VDC	Green
-28 VDC	Green
Xmtr Power	Black
Synth	Blue
Carrier Dev	Blue*
AFC Error	Blue**
Ch 1 Carr	Blue***
Ch 1 Dev	Blue***
Ch 2 Carr	Blue***
Ch 2 Dev	Blue***

*Reading is present only when baseband input is applied or when the Test Tone switch on the Baseband Module is at BB. Carrier Deviation may be initially checked using the Test Tone. When baseband input is present, BB Test Tone should be off and the Baseband Atten control set to produce the proper deviation meter reading.

**AFC Error may read outside the blue zone if the transmitter is detuned. After tuning the transmitter, assure that the correct reading is attained.

***Reading is present only when Audio 1 (or Audio 2) input is applied or when the Test Tone switch is at AUD 1 (or AUD 2). Levels may initially be checked using the Test Tone. When Audio 1 (or Audio 2) input is present, the Audio Test Tone should be off and the Audio Channel 1 (or Audio Channel 2) attenuator set to produce the proper Ch 1 (or Ch 2) Deviation meter reading.

6. Turn the DEVIATION TEST Switch to OFF.

3.3 TRANSMITTER TURN ON - RF Head Remoted

1. Install the RF Head in the remote enclosure and the remote patch cord in the transmitter enclosure (see INSTALLATION SECTION, Paragraph 2.4).

2. Assure that the Variable Amplitude Equalizer U-Links in the Baseband Module are plugged into the terminals corresponding to the remote cable length. Cable lengths are indicated on the P.C. Board in feet.

3. With the Remote RF Head meter select switch at TRANSIT, perform the steps given in paragraph 3.2.2 through 3.2.6.

4. Check the following RF Head meter readings: (This meter should be left in TRANSIT when not in use.

Parameter	Meter Zone
-15V	Green
+15V	Green
+28V	Green
AFC ERR	Blue*
SYNTH	Blue

*AFC ERROR may be read outside the blue zone if the transmitter is detuned (see Paragraph 3.3).

3.4 TRANSMITTER TUNING PROCEDURE

1. If the RF Head is remoted, this procedure is best performed by two persons using sound-powered handsets.

2. Switch the AFC Switch located on the XMTR AFC Module to disable. Two fault lights should illuminate; one on the XMTR AFC Module and one on the Control Monitor Module.

3. Tune the direct reading frequency indicator to the desired transmitter frequency. Watch the front panel frequency meter on the AFC Module, adjust the transmitter for zero center indication.

4. Switch the AFC to the enable position and check to see that all fault lights are off. The transmitter is now tuned and locked on frequency.

$f_o = 6.4375\ GHz = 6,437.5\ mhz$

$$\frac{f_o - 6,437.5\ mhz}{3\ (model)} = (2145.83\ mhz) - (70\ mhz) = 2075.83\ mhz$$

$(2075.83) \div (20) = 103.791\ mhz$

$(103.791)(20) = (2075.820\ mhz) + (70) = 2145.820\ mhz =$

$(2145.820)(3) = 6437.460$

$$\begin{array}{r} 6,437.5 \\ -\ 72.5 \\ \hline 6,365.0 \end{array}$$

FORM IN 9518

SYNTHESIZER SETTINGS FOR 5925 MHz to 6512.5 MHz

OUTPUT FREQ. MHz	SYNTH. FREQ. KHz	OUTPUT FREQ. MHz	SYNTH. FREQ. KHz	OUTPUT FREQ. MHz	SYNTH. FREQ. KHz	OUTPUT FREQ. MHz	SYNTH. FREQ. KHz
[illegible]	100272	6071.2	97687	6212.0	100033	6360.3	97624
[illegible]	100358	6078.6	97810	6219.5	100158	6367.7	97800
[illegible]	100488	6086.0	97933	6226.9	100282	6375.2	[illegible]
[illegible]	100617	6093.5	98058	6234.3	100405	6382.6	[illegible]
[illegible]	[illegible]710	6100.9	98182	6241.7	100528	6390.0	98095
	[illegible]835	6108.3	98305	6249.1	95859	6397.4	98213
	[illegible]957	6115.7	98428	6256.5	95976	6404.8	[illegible]330
	[illegible]080	6123.1	98552	6264.0	96095	6412.2	98448
	[illegible]203	6130.5	98675	6271.4	96213	6419.6	98565
	[illegible]328	6137.9	98798	6278.8	96330	6424.5	[illegible]43
	[illegible]452	6145.3	98922	6286.2	96448	**6437.5**	**98849**
	[illegible]575	6152.8	99047	6293.6	96565	6462.5	99146
	[illegible]698	6160.5	99175	6301.0	96683	6487.5	99643
	[illegible]822	6167.6	99293	6308.4	96800	**6512.5**	**100040**
	[illegible]945	6172.5	99375	6315.9	96919		
	[illegible]070	6177.5	99458	6323.3	97037		
	[illegible]193	6182.4	99540	6330.7	97154		
	97317	6189.8	99663	6338.1	97271		
	[illegible]440	6197.2	99737	6345.5	97389		
	[illegible]565	6204.7	99912	6352.9	97506		

TABLE 3-1. VALUES OF A MULTIPLICATION FACTOR N
VALUE OF MULTIPLIER M IS SHOWN IN ( )

Freq. in MHz	TCM-60(1)A/B	TCM-(2)A/G	TCM-60(3)	TCM-60(4)	TCM-60(6)A/B	TCM-60(8)
1700-2100	17-21					
1950-2300	19-23					
2200-2500	21-24					
2450-2700		12-13				
3700-4200		17-21				
4400-5000		22-25				
5900-6900			19-23			
6800-8400				17-21		
10,700-11,700					17-20	
11,700-12,200					17-20	
12,250-13,250					20-22	
13,800-14,600						17-18
14,400-15,250						18-19

F_X = Crystal Frequency

XMTR Freq. in MHz (F_O) = (Crystal Freq. in MHz (F_X) x N + 70) M

Where N = Multiplication Factor

Where M = Multiplier - Last digit in equipment RF Head designator

Example: TCM-60(M)

$F_O = (F_X \cdot N + 70) M$

and F_X - Crystal frequency is determined by

$$F_X = \frac{\frac{F_O}{M} - 70}{N}$$

F_X must fall within 95-100.5 MHz

Example

Freq. 6048.9 MHz
divide by 3 (Model #)
minus 70 MHz
Divide by Harmonics 19 to 22nd.
20 used = 097315 crystal freq.

Crystal Freq. 97.315
x Harmonic 20 + 70 x model #3
= 6048.9 MHz

TerraCom

Section 4

CIRCUIT OPERATION

4.1. GENERAL INFORMATION

Transmitter circuit operation is described in the following detailed circuit descriptions (DCD's).

Each DCD contains four sections:

1.0 Introduction

2.0 Performance Specifications

3.0 Technical Description

4.0 Operating Procedure

All standard and optional PC boards available for use in a particular module are described in the DCD for that module. More detailed component level descriptions can be found in the DCD's for the individual boards, contained in the TCM-6 Maintenance Manual.

4.2. INDEX

Module	DCD Number
Remote Enclosure Assembly	12010028
D.C. Power Supply	12010190
A.C. Power Supply	12011586
FMR Module	12011600
RF Module	12011642
Control Monitor Module	12011643
Baseband Module	12011644
Synthesizer Module	12011645
AFC Module	12011646
Digital Frequency Synthesizer	12011647
Data Module	12010984/12013060

12010028 - REMOTE ENCLOSURE ASSEMBLY

1.0 INTRODUCTION

The Remote Enclosure forms a weatherproof housing for an RF Head for either a Receiver or Transmitter. The Remote Enclosure has a self-contained monitoring system to allow the analysis of the vital functions of the enclosed RF head. Provisions are made for the use of the handset or headset for communication between the Remote Enclosure and main radio location. In the transmitter configuration, the 100 MHz Limiter Driver Amplifier, (12010050) is installed in the Remote Enclosure to provide the proper input level.

2.0 PERFORMANCE SPECIFICATION

2.1 Meter Functions

Meter Movement	0-100 uA
	1k ohm
Meter Scale	0-100 black
	35-65 blue
	45-55 green

Switch Positions	Scale Color for Expected Meter Readings
Transit	0
+15V (tx)	Green
-15V	Green
-28V	Green
AFC ERR	Black
SIG STR (Rx)	Black
THRESH (Rx)	Blue
SYNTH (Tx)	Blue

Meter readings which may be obtained from an RF Head other than as designated by the switch position label are irrelevant. The switch on the Control Monitor should be in the transit position when the meter on the Remote Enclosure is in use. The Remote Enclosure switch should be in the transit position when the meter on the Control Monitor module is used.

3.0 TECHNICAL DESCRIPTION

Refer to Schematic 12010028. The same enclosure is used in both the Transmitter and Receiver configuration. The meter circuit board is an integral part of the cable connector. The meter is protected by opposed polarity parallel diodes and, in addition, is shorted in the transit position of the meter function switch. Due to the 10% tolerance in the meter impedance R14, a potentiometer connected as a rheostat is used to adjust the total meter input impedance to the proper value. Calibrating resistors are included to adjust for the correct reading on the RF Head monitor functions.

These are:

R6	AFC ERROR
R8	SIG STR (Rx)
R10	THRESH (Rx)
R12	SYNTH (Tx)

The carbon headset circuit is made up of R1, R2, C1, C2, J4, and associated harness wiring. R2 supplies a bias current of 1 mA for the microphone at the remote enclosure and C1 is its associated blocking capacitor. R1 supplies a 1 mA bias current for the microphone at the main radio enclosure, and C2 is its associated blocking capacitor. Both bias currents are derived from the -15V supply.

Power and signal connections are provided under a cover on the front panel for a 100 MHz Limiter Amplifier Driver (12010050) to be connected in the Transmitter configuration. A more complete description of this circuit can be found in the TCM-6 Maintenance Manual.

4.0 OPERATING PROCEDURE

The variable amplitude euqlaizer (12011054) in the Transmitter Baseband module must have its U-links in the proper position for the number of feet of cable in use to the Remote Enclosure. Cable lengths are indicated on the PC board in feet.

The Phase Equalizer (12011022) in the Receiver IF Module may need to be

readjusted for best performance with each different cable. The enclosure is provided with a carbon microphone circuit for use with an optional handset or headset. If the use of the sound powered phones is desired, the circuit may be easily modified for parallel operation. The phone connector on the RF panel at the main radio enclosure has plug-in connections on the back, and the black and white wires may be switched to provide parallel wiring for sound powered phones.

To prevent weather damage to the threads of the cable connector cover and the enclosure connector cover, the two covers may be screwed together.

During shipment, and whenever the meter circuit is not in actual use, the meter function switch should be left in the Transit position.

If any possibility of a pressure differential exists, when it becomes necessary to open the enclosure, the pressure relief button located next to the RF connector should be actuated.

12010190 - DC POWER SUPPLY

1.0 INTRODUCTION

The DC Power Supply Module (Schematic Diagram 12010190) is a high efficiency switching regulator type followed by individual series pass regulators. The supply operates over a voltage input range of 22 to 32 volts DC on the low range setting and 44 to 56 volts on the high range setting. Regulator output voltages are +15 VDC, -15 VDC and +5 VDC. There is also an unregulated -28 VDC output. The supply is equipped with: (a) foldback current limiting; (b) overvoltage protection from voltages 30% greater than normal; and (c) reverse polarity protection. Lamps are used to indicate: (a) fault of any output varying more than ±25% from nominal value and (b) when power is applied to the supply. The supply efficiency is approximately 60% at full load when operated from 28 VDC. The switching regulator operates at approximately 20 kHz. The DC to DC Power Supply is comprised of an enclosure and seven printed circuit boards. A circuit breaker with ON/OFF switch and lamps are mounted on the front panel of the enclosure. Internally, the enclosure provides heat sinking for the switching transistors. The seven printed circuit boards consist of four voltage regulator boards, a voltage switching board, a transformer, and a master board into which the other six plug or mount. The master board contains the circuitry for input voltage and current protection, DC to AC inverter, 28 VDC unregulated supply, and the alarm circuits.

2.0 PERFORMANCE SPECIFICATIONS

2.1 Electrical

2.1.1 Input: 22 to 32 VDC @ A or 44 to 56 VDC @ A

2.1.2 DC Outputs:

	-28V	-15V	+15V	+5V	-28V unregulated
Set Tol(volts):	±0.1	±0.05	±0.05	±0.05	None
Reg (%):	±1.0	±1.0	±1.0	±1.0	——
Res Load-Amps (min):	0.1	0.2	0.1	0.05	0.0

Res Load-Amps (max):	1.2	1.2	0.6	1.2	0.1
Ripple(mV p-p):	10	5	5	10	1000
Impedance (0-100 kHz):	0.5	0.5	0.5	0.5	10.0

2.1.3 Short Circuit Protection: All regulated outputs use foldback current limiting to limit short-circuit current to 100 ma. The unregulated -28V output has a 1/4 amp fuse, or 1/2 amp fuse if fan kit is installed.

2.1.4 Overvoltage Protection: All regulated voltages are protected from voltages greater than 130% of normal.

2.2 Mechanical

2.2.1 Demensions: 9.42W x 19.0H x 22.9D (cm)
3.75W x 7.50H x 9.0D (inches)

2.2.2 Weight: 6.37 kg (14.0 lbs)

2.3 Environmental

2.3.1 Operating Temperature: -30°C to 65°C

2.3.2 Altitude: 4572 meters (15,000 ft.)

3.0 TECHNICAL DESCRIPTION

3.1 Input Voltage Protection Circuits

The protection circuits consist of CR4, CR5 and CR6; Q7, Q8 and their associated resistors, circuit breaker CB1 and relay K1. Three primary functions are performed by these components: reverse input voltage protection, excessive input voltage protection and excessive current drain protection. Reverse voltage protection is provided as follows. If input voltage is connected with '+'

on E2 and '-' on E1, then CR5 will be reverse bias and K1 therefore cannot close. If K1 is not closed then the pass regulator (and other circuits) are disconnected. With normal polarity connections, Q7 is forced into conduction by the bias supplied through CR5, R17. This closes K1, applying power to Q6 and subsequent circuits. Overvoltage protection is provided by CR4. As long as the input voltage remains less than 36 volts, CR4 does not conduct. At 36 volts CR4 conducts thereby turning on Q8 which turns off Q7, causing K1 to open. Over-current protection is provided by the magnetic circuit breaker CB1. It is normal for the red Fault Lamp to be lit whenever the input voltage is (correctly) connected and the supply is not on. This is accomplished by the normally closed K2 contact, R20 and CR5. When the supply is turned on, through CB1, K2 will evenually close, turning off the red Fault Lamp. Assuming that K1 has closed, power will be available to the remaining circuitry.

3.2 DC to AC Inverter

Transistor Q6 and zener CR3 reduce the input to 18 VDC. This voltage is the primary power for Z1/Z2, the inverter input switching transistors Q3/9 and the oscillator Q1. Zener diode CR2 reduces the 18 VDC to 5 volts for Q2, Z3 and Z4. The integrated circuits Z1 through Z4 provide control functions over the pulse width of the free running relaxation oscillator Q1. These pulses are then used to turn on and off the inverter amplifier which consists of Q3/Q4/Q5 and Q9/Q10/Q11, their associated resistors and transformer T1. The inputs to Q3 and Q9 are 180 degrees out-of-phase and are being switched at a rate of approximately 20 kHz. This switched current through the transformer input winding produces AC voltages on the four output windings as well as the feedback control winding and an unregulated 28 VDC winding. The feedback winding is connected to a rectifier consisting of CR10 and CR11. After filtering by L3 and C13, this DC feedback voltage is

then applied to pin 2 of Z1. The function of Z1 is to compare the feedback voltage with an internal reference established by R2, R3 and C2. The difference between these levels is amplified and routed, through R4, to pin 3 of Z2. The function of Z2 is to compare the output of Z1 with a ramp reference signal generated by R6 and C3. The ramp reference is accomplished as follows: R6, C4 and Q1 establish a free running clock oscillator at approximately 40 kHz. As Q1 conducts, for short periods of time, Q2 is pulsed on. Transistor Q2 performs two functions; sets a flip-flop in Z3 and effectively grounds the junction of R6 and C3 through CR1 which resets the ramp. When Q2 turns off, C3 is allowed to charge at a rate established by R6. This ramp voltage is sampled via pin 2 of Z2. When the increasing ramp voltage exceeds the amplified feedback signal (pin 3), the output signal on pin 6 goes to zero. This has the effect of shutting off the conducting inverter transistor through gates in Z4 thereby regulating the pulse width. Flip-flops in Z3 and Z4 control the inverter switching to assure that; they alternate, and only one is on at a time.

The operation can be viewed as a cycle consisting of the following events:

(1) The clock pulse turns on one side of the inverter amplifier.
(2) Z1 measures the feedback voltage, inverts and amplifies it.
(3) Z2 then compares this voltage to a ramp voltage, whose voltage is a function of time. When the ramp exceeds the feedback, an output is produced.
(4) The output shuts off the inverter amplifier.
(5) The flip-flop changes states so as to turn on the other side of the inverter amplifier on the next clock pulse.

The cycle then repeats starting at (1). The effect is to provide a variable pulse width, established by the amplitude of the feedback signal. If any output were overloaded, the feed-

back voltage would decrease which, in turn, would increase the pulse width causing an increase in output. Conversely, should the output voltage increase, the pulse width would decrease, causing a reduction in the output.

3.3 Unregulated 28 Volt Supply

Diodes CR12 and CR13 provide rectification. Coil L4 and C15 provide the filtering. The output is then routed through a 1/4 amp slo-blow fuse, or a 1/2 amp fuse when the fan kit is supplied. The amber ON lamp is connected across the -28V unregulated output and indicates operation of the inverter circuits.

3.4 Alarm Circuits

The alarm circuits consists of relay K2, transistors Q12/13 and their associated resistors. The unregulated -28V turns on Q12 through R28. When K2 conducts, current flows through K2 which closes. When K2 closes, the red Fault Lamp goes out, and the Fault output terminal presents a high resistance (1.5K) to common ground. If the unregulated 28V should fail, the relay would open presenting a low resistance (82 ohms) on the Fault output and also illuminating the red Fault Lamp. Another cause of K2 opening is whenever any of the four regulator boards provide an output ±25% from their nominal value. This function is accomplished by providing bias from the regulator boards to the base of Q13. As Q13 turns on, it removes the bias from Q12 which no longer conducts, and K2 opens.

3.5 Voltage Regulator PC Boards

Refer to Schematics 12010186, 12010187 and 12010189 (which are essentially identical). The AC input from T-1 is applied to the board on pins 2 and 3. The AC is rectified by diodes CR2 and CR3. It is then filtered by L1 and C2. The internal reference (Z1, pin 4) is connected to the non-inverting input (pin 3). The pot R10 divides down the output voltage and sends back an error signal to pin 2 which is internally compared to

the voltage at pin 3. The output of Z1 (pin 6) adjusts the base of Q2 for 5, 15, or 28 volts measured at the output terminals. R6, R7 and R8 on the emitter of Q2 drop a small voltage as a function of the output current. This voltage is sensed at pin 1 of Z2. As the output voltage decreases due to overload, the output current also decreases. This reduces dissipation of Q2 under an overload condition. Primary power for Z1 and Z2 is provided by a voltage doubler consisting of CR12, CR13, C1, C9 and a preregulator consisting of CR4, Q1 and R1. Overvoltage protection is provided by Z2 and regulated components. A sample of the output voltage is provided to Z2 through a voltage divider. This sample is compared to a referance voltage provided by R16, R17. When Z2 senses an overvoltage condition, its output (pin 6) goes high, forcing Q5 into conduction. Resistor R15 provides positive feedback to latch Z2 on. The overvoltage protection is self-correcting in the sense that it attempts to turn on the regulator at regular intervals until the overvoltage condition is corrected. This function is accomplished by Q3, Q4 and their associated components. When the regulator is shut down, voltage is available to charge C8 through R19. This voltage increases until it exceeds the zener point of the diode in the emitter circuit of Q4. When this occurs, current flows through Q4 which turns on the (SCR) Q3. Q3 shorts out the shut-off voltage allowing the output voltage to rise so that another comparison can be again made by Z2. This sampling is at a 1 second rate and continues until the overvoltage condition no longer exists. Transistor Q6 senses the output voltage (via bias resistors R21 through R24) and signals the master board fault circuits whenever the voltage varies above or below a predetermined level.

4.0 OPERATING PROCEDURES

Either 24 or 48 VDC input may be selected by repositioning the Voltage Switching board inside the module. See Schematic 12010190, receptical J1.

12011586 - AC TO DC POWER SUPPLY

1.0 INTRODUCTION

The AC Power Supply is a series pass regulator type. AC input voltage is switch selected 115 or 230 VAC. Four regulated DC outputs are provided at +15V, -15V, -28V, and optional +5V. An unregulated -28V is also provided. Built-in fault detection circuits provide an indication of failure.

The Power Supply includes all input and output terminations, controls, and protective devices for powering a microwave radio system.

2.0 PERFORMANCE SPECIFICATIONS

2.1 Electrical

2.1.1 Input: 102-132 VAC rms @ 1.5A max or
204-260 VAC rms @ .75A max
(Internal Switch Selected)
47-440 Hz

2.1.2

DC Outputs (Volts)	-28	-15	+15	+5	-28 unreg.
Set Tol. (Volts)	±0.1	±0.05	±0.05	±0.05	None
Reg. (%)	±1.0	±1.0	±0.5	±0.5	----
Res. Load (Min)	0.1	0.2	0.1	0.05	0.0
Res. Load (Max)	1.2	1.2	0.6	0.6	0.1
Ripple (Mv p-p)	1.0	1.0	1.0	1.0	10.0
Impedance (0-100 kHz)	0.5	0.5	0.5	0.5	10.0

2.1.3 Short-Circuit Protection: All regulated outputs use fold back current limiting to limit short-circuit current to 100 mA. The unregulated -28 output has a 1/4 amp fuse, or 1/2 amp fuse when fan kit is installed.

2.1.4 Overvoltage Protection: All regulated outputs are protected from voltages greater than 130% of nominal.

2.1.5 Fault Indicator: There is a red front panel fault lamp that lights whenever any regulated output varies more than ±25% from nominal. A fault signal is also provided at the connector.

2.2 Mechanical

2.2.1	Size:	3.75 x 7.50 x 9.0 inches
2.2.2	Weight:	14.0 lbs. max.
2.2.3	Finish:	Front Panel - Hard Anodized Rest of Unit - Chemfilm per MIL-C-5541

2.3 Environmental

2.3.1	Operating Temperature:	-30°C to +65°C in housing
2.3.2	Storage Temperature:	-40°C to +85°C
2.3.3	Operating Altitude:	To 3700 meters (12,000 ft.) max

3.0 TECHNICAL DESCRIPTION

3.1 Mechanical

The AC power supply is comprised of an enclosure and six PC boards. The circuit breaker/on-off switch, fault light, and pilot light are on the front panel. All power supply connections are made through a rear panel connector. Internally, the enclosure provides heat sinking for the regulator PC boards and the power transformer.

The six PC boards consist of a mother board, four regulator boards, and the transformer board. The mother board provides interconnections between the other boards and has circuitry for the -28V unregulated supply, the fault alarm, and the voltage conversion switch. The four regulators and the transformer board plug into the mother board on PC edge connectors.

3.2 Electrical (See Schematic 12011586)

The AC input from the connector, J1, is applied to the transformer primary through the circuit breaker on-off switch and the voltage conversion switch. The circuit breaker, CB1, is a delayed action type rated at 1.5A. The voltage conversion switch, S1, connects the two transformer primaries in parallel for 110 VAC operation or in series for 220 VAC operation. This switch also connects a resistor, R3, in series with the fault lamp for 220 VAC operation. The amber

pilot light is connected across one transformer primary for operation with either input voltage. The five secondaries of the power transformer are connected to their respective regulators through a PC edge connector, J2.

3.2.1 Voltage Regulator

3.2.1.1 Introduction

The voltage regulator printed circuit board assemblies accept an AC voltage from the power transformer and provide regulated DC voltage of the desired value. The nominal output voltage is selected by using appropriate component values. Otherwise all the assemblies are identical. The block diagram (Figure 1) shows how the five basic blocks are connected. Each one will be described separately. Refer to Schematic Diagram 12011584.

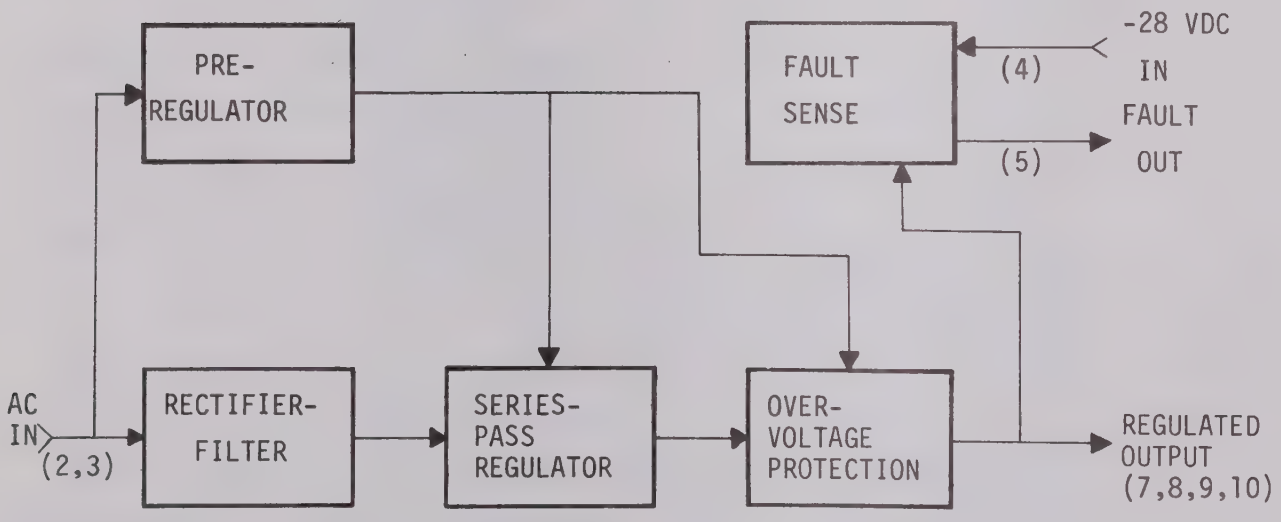


FIGURE 1

3.2.1.2 Rectifier - Filter

The secondary voltage from T1 is received on pins 2 and 3 of the PC board. The AC is rectified by diode bridge CR1. It is then filtered by C3 and supplied to the series-pass transistor Q2.

3.2.1.3 Pre-regulator

The AC supplied to the input is also used by a voltage doubler circuit C1, C2, CR2, and CR3. The voltage doubler supplies a regulator circuit consisting of Q1, R1, and CR4. The output of the pre-regulator, Q1, is used to supply operating voltage for Z1 and the overvoltage protection circuit.

3.2.1.4 Series-pass Regulator

Z1 is a high performance voltage regulator integrated circuit. It has an internal reference voltage which is present at pin 4. This output is connected through filtering circuit R5/C5 to pin 3, the non-inverting input of an operational amplifier. The output voltage of the regulator board is sampled through a divider string consisting of R9, R10, and R11. Pot R10 provides an adjustment of the output voltage. This sample signal is fed to pin 2, the inverting input of the operational amplifier. The output of the operational amplifier is taken from pin 6 to drive the series-pass transistor Q2.

The current foldback feature of the IC is used by connecting pin 1 of Z1 to the positive output of the regulator. This is used as a

reference. The feedback for the current limit is taken off the junction between R7 and R8. Pot R7 provides an adjustment of the current limit point. The feedback voltage is developed as current is increased through resistors R2, R3, and R4. This current increase develops an increase in voltage which is sensed at pin 10 of Z1 and will shut down the regulator when the current setting is exceeded.

The integrated circuit Z1 has built-in short-circuit protection connected to the current limit function. Short-circuit output current is limited to approximately 100 mA.

3.2.1.5 Overvoltage Protection

Q3, Q4, and Q5 form the overvoltage protection circuit. CR5 is selected to zener at the same voltage as the rated output voltage. During normal operation CR5 does not conduct, leaving Q3 off. This turns on Q4, which turns off Darlington Pair Q5. If the output voltage increases beyond the rated value, CR5 conducts and turns on Q3, which shuts off Q4. This turns on Q5, clamping the output to nearly zero volts, and the regulator shuts off.

C8 maintains this condition for a short period of time by charging through Q3, holding Q3 on. When C8 is charged, Q3 turns off, returning the supply to normal operation. If the output voltage again increases too high, the process repeats. This continues until the output is within its safe range.

3.2.1.6 Fault Sense

Q6 senses the output voltage and signals the fault alarm whenever the output voltage goes below a predetermined level. During normal operation Q6 is biased on by R17, R18, and R21, and the voltage appearing at pin 5 is positive with respect to pin 8. If the output voltage decreases, the bias on Q6 also decreases until Q6 stops conduction. This allows the collector of Q6 to go to -28 volts, and -28 volts to appear on pin 5 via CR8. The diode CR8 is to isolate the fault outputs by acting as a gate. The fault circuit is actuated any time the output voltage drops 25% below the rated value. This can be caused by low input voltage, overload of the output, or overvoltage at the output which caused the overvoltage protector to clamp the output.

3.2.2 Unregulated Supply

The AC voltage from T1 is rectified by diode bridge CR1-4 and filtered by C1. A simple zener regulator consisting of R6, CR5, and Q1 is used to provide a minimal amount of regulation. The output of this circuit supplies operating power to the fault alarm circuits and, through fuse F1, supplies the -28V unregulated output of the power supply.

3.2.3 Fault Alarm

The fault alarm circuit consists of Q2, Q3, K1, and related components. When all the regulators are operating properly, their fault outputs are floating. In this condition, Q2 is turned off which turns Q3 on. This energizes K1 which disconnects the fault lamp, DSi, from the AC line and switches off the fault alarm output. Whenever any of the

regulators faults, the fault alarm bus is connected to -28V unregulated. This turns on Q2, which turns off Q3, de-energizing relay K1. This lights the fault lamp and grounds the fault alarm output. The fault lamp also lights if the power switch is in the off position with power applied to the input.

4.0 OPERATING INSTRUCTIONS

4.1 Make appropriate connections to the rear panel connector according to the schematic. With power applied, the fault light will light. When the power switch is turned on, the fault light will go off and the pilot light will come on. If this does not occur, refer to the next section for trouble-shooting.

12011600 - FMR MODULE

1.0 INTRODUCTION

The transmitter FMR Module (Schematic 12011600) is an optional module and contains up to six (6) printed circuits; a phase equalizer, 70 MHz limiter, 70 MHz FM demodulator, invert/non-invert amplifier, low pass filter, and an optional variable amplitude equalizer. The variable amplitude equalizer is used in those systems which have the transmitter RF Module remoted. The FMR Module demodulates 70 MHz frequency modulated signals having signal levels of -10 to +10 dBm.

2.0 PERFORMANCE SPECIFICATIONS

IF Input Impedance	75 ohms
Video Output Impedance	75 ohms
IF Frequency	70 MHz $\pm$10 MHz
Conversion Linearity	$\leq$1%
Minimum Input Level	-10 dBm
Video Frequency Response	$\pm$.1 dB to 7.5 MHz $\pm$.3 dB to 10 MHz
Video Output Level (No Cable Equalization)	-3.8 dBm for 4 MHz Peak Deviation
Video Output Level (With Cable Equalization)	> -9.8 dBm for 8 MHz Peak Deviation
Power Requirements	+15V @ 70 mA -15V @ 430 mA

3.0 TECHNICAL DESCRIPTION

3.1 The IF Phase Equalizer (12011022C) compensates for group delay in the IF and Demodulator signal path. The characteristics of the equalizer is that of the classical type B.

Input isolation amplifier (Q1) raises the level of the IF signal by 10 dB. Its primary function is to buffer the phase equalizer circuit during alignment and to make up for losses in the equalizing network.

Components C6 and L3 are adjusted for best group delay while R10 is adjusted for best amplitude response. Amplifier Q2 terminates the equalizer circuit and provides a 75 ohm interface impedance.

3.2 The 70 MHz Limiter (12011598) is an amplifier which accepts a low level signal and amplifies it through several stages and limits only in the last limiter stage, as higher and higher level signals are applied, more stages of the amplifier are driven into limiting.

A 75 ohm, 10 dB, resistive TT attenuator is provided on the circuit board. The attenuator is in the circuit with the U-Link in the E17, E18 terminals, and the IF level to the TCM-6 Transmitter (J14) should be 0 to +10 dBm/75 ohms (normal setting due to +6 dBm IF output level from TCM-6 Receiver). The attenuator is bypassed with the U-Link in the E15, E16 terminals, and the IF level to the TCM-6 Transmitter should be -10 to 0 dBm/75 ohms.

The final output stage is temperature compensated so that a constant output amplitude is maintained over the operating temperature range. The output from this stage is taken through a bandpass filter, designed to remove harmonics generated by the limiting stages. The IF output monitor (E5) is available on the front panel of the completed FMR Module and may be used to view the IF with a spectrum analyzer. Also on the board are two built-in detectors to aid in alignment and troubleshooting.

3.3 The FM Demodulator (12011007) accepts frequency modulated information centered at 70 MHz with a 20 MHz symmetric bandwidth and outputs this information as a high linearity video signal.

3.4 The Inverting/Non-Inverting Amplifier (12011010) is used to provide approximately 14 dB gain (into 75 ohms) and selectable output video (baseband) phase. Inverted or non-inverted outputs (equal within 0.5 dB) can be selected by means of U-Link switches. Provision is made for a choice of input impedance (75 ohms or 1K ohm). In this application the jumper between E18 and E19 is absent so that

the amplifier gain is a maximum with an input impedance of 1K ohm.

3.5 The Video Low Pass Filter (12011032) is a five element two T section filter of maximum flat (Butterworth) design. Its purpose is to pass all baseband frequencies (50 Hz to 15 MHz within 0.5 dB) and attenuate all frequencies above the desired frequencies. Above 15 MHz the frequency response falls off at greater than 30 dB per octave. The low pass filter is used to limit the baseband response and prevent higher frequency noise from entering the system.

3.6 The variable amplitude equalizer (12011054), an option, is used in those systems which have the RF Transmitter Module in a remote configuration. Combinations of fixed RC and RL networks are used to compensate for frequency response variations due to various lengths of remoting cables. Remoting cable lengths of 50 feet, 100 feet, 200 feet, and 300 feet can be used by changing the two U-Link type switches (P1 and P2) to the position corresponding to the cable length.

4.0 OPERATING PROCEDURE

4.1 The Inverting/Non-Inverting Amplifier (12011010) provides for a selectable output video (Baseband) phase and choice of input impedance. For use in the receiver IF Module, the strap between E2 and E3 is removed to provide a 1K input impedance. The output level is adjusted with the level pot on the demodulator board.

For use in the transmitter RF Head, the strap between E2 and E3 is left in to provide a 75 ohm input impedance and gain control.

Checks to DC potentials, gain, and response are necessary to assure proper operation. Voltage at the test points all should be as follows:

T.P. 1	-0.6 $\pm$0.1V
T.P. 2	13.7 $\pm$0.1V ("+" supply at 15.0V)
T.P. 3	0 $\pm$0.2V
T.P. 4	0 $\pm$0.2V

T.P. 5 13.7 ±0.1V ("+" supply at 15.0V)

T.P. 6 -0.6 ±0.1V

T.P. 7 -5.7 ±0.5V

4.2 When the Transmitter RF Module is used in the remote configuration, U-Link switches P1 and P2 on the Variable Amplitude Equalizer (12011054) must be set to position corresponding to the remote cable length. Cable lengths are indicated on the PC board in feet.

12011642 - RF MODULE (TRANSMITTER)

1.0 INTRODUCTION

The basic 2 GHz RF Module (12011642) contains twelve subassemblies; the deviation control, the VCO driver amplifier, an Interface Board, Voltage Controlled Oscillator (VCO), Peripheral Mode Isolator, Power Amplifier, Ferrite Isolator, Inter-Digital Filter (IDF), Balanced Mixer, 80 MHz Filter Amplifier, Local Oscillator Amplifier/Multiplier, and an LO Reference Band-pass Filter. Above 2 GHz additional subassemblies are added to increase the output frequency. In the 606 RF Module, for example, there are two additional multipliers, three additional isolators and one additional band-pass filter.

2.0 PERFORMANCE SPECIFICATIONS

2.1	Baseband Spec		
	2.1.1	Input Impedance	75 ohms
	2.1.2	Input Return Loss	20 dB min
	2.1.3	Frequency Response	10 Hz -10 MHz $\pm$.5dB
	2.1.4	Deviation Sensi.	8 MHz p-p for .5 volt p-p
2.2	RF Spec		
	2.2.1	Output Impedance	50 ohms
	2.2.2	Output Return Loss	15 dB min
	2.2.3	Power Out	5 watts @ 2 GHz
	2.2.4	Spurious Responses	>50 dB down
	2.2.5	Harmonics	> 50 dB down

3.0 TECHNICAL DESCRIPTION

3.1 The Deviation Control (12011681) is used in the Transmitter RF Module to terminate the baseband input in 75 ohms and control the deviation sensitivity of the VCO. It is a passive circuit.

3.2 The VCO Driver (12011682) is used in certain Transmitter RF Modules whenever insufficient level is available at the output of the 12011681 Deviation Control to properly deviate the VCO. It is standard in the TCM-601 and TCM-602 RF Modules. In TCM-603 and TCM-604 RF Modules, it is an option which is needed if it is ever desired to use an FMR Module when the RF Module is remoted.

3.3 The Interface/Lamp Driver (12011596) is composed of two circuits. A capacitor/resistor network is used to isolate the AFC DC bias from the video/audio signal at the output of the baseband amplifier. This allows both signals to be applied to the same input pin on VCO. A lamp driver circuit is used to measure the detected carrier output voltage. This turns on the carrier fail alarm lights when the detected voltage drops 6 dB.

The input impedance of the interface circuit is approximately 1.5K ohms due to the 3K ohm input impedance of the VCO and 3K ohm resistor from the AFC output. A 200 uFd capacitor in conjunction with the input impedance form a designed lower frequency corner of .6 Hz with an insertion loss of $\pm$.1 dB from 1 Hz to 15 MHz.

3.4 Voltage Controlled Oscillator is composed of two stages: an Emitter Follower and a Cavity Oscillator. The high impedance emitter follower modulates the base of the cavity oscillator. The cavity oscillator is mechanically tuned by changing the length of the tuning shaft. The oscillator is electrically tuned by varying the base bias of the oscillating transistor; an increasing voltage causes a decreasing frequency. The output power is .850 watts nominal and the sample power level is 7 mW nominal.

3.5 Peripheral Mode Isolator. The PMI is a wideband (multi-octave) low VSWR isolator. It provides the VCO with a constant impedance of 50 ohms with up to 2 to 1 VSWR at its output port.

3.6 Power Amplifier. The wideband power amplifier, driven from the PMI, amplifies the VCO by 9 dB bringing the power level to 5 watts (nominal).

3.7 The ferrite isolator which follows the PA provides the power amplifier with a constant impedance of 50 ohms with up to 2 to 1 VSWR at its output port.

3.8 The Interdigital Filter (12011048) is a mechanical bandpass filter. It is designed to reduce the second harmonic by greater than -50 dBm while keeping the insertion loss low (approximately 0.5 dB @ 2 GHz). The filter exhibits a 50 ohm input and output impedance whose VSWR is better than 1.2:1.

3.9 Balanced Mixer provides the 70 MHz difference signal which is used in the AFC loop by mixing the VCO (carrier frequency) sample frequency with the crystal oscillator reference signal. The reference signal is the 16th through the 23rd harmonics of a 100 MHz crystal oscillator.

3.10 The 70 MHz filter amplifier (12011533) is used to extract the desired 70 MHz signal from the output of the mixer while attenuating the two original frequencies.

3.11 The local oscillator amplifier (12011017) amplifies the 94 to 106 MHz reference signal from either the crystal oscillator or synthesizer to approximately 500 milliwatts. The 500 milliwatts Class C amplifier drives a step recovery diode. The 16th through 23rd harmonic is extracted through a bandpass filter. Capacitor C9 is used to tune the output of the step recovery diode for maximum power output (-5 dBm minimum). The output signal is mixed with the VCO sample to form the 70 MHz AFC loop error signal.

3.12 The Local Oscillator Amplifier Bandpass Filter is a five section bandpass filter with a 400 MHz passband response. The insertion loss is 1.0 dB typical, with a 1.35 to 1 VSWR within the passband. Its purpose is to remove all but the desired harmonics from the output of the comb generator.

4.0 OPERATING PROCEDURE

Instructions for tuning the RF Module are contained in Section 3 of this manual, OPERATING INSTRUCTIONS, Paragraph 3.4.

12011643 - CONTROL MONITOR (TRANSMITTER)

1.0 INTRODUCTION

The Control Monitor monitors all of the critical functions of the system through meter reading. This allows an analysis of the system's operation by observing the different meter functions. A Remote Fail Relay is also installed (customer's option) to allow monitoring of the fault indication from another location.

The Transmitter Control Monitor (12011643) is assembled with two control switches. One is for energizing the Test Tone Oscillator. The other is for energizing the RF Standby Relay in the RF Module. Both of the functions are available as a customer option.

In addition to the above mentioned controls, the control monitor module has step attenuators for the control of the Video and Audio signals.

2.0 PERFORMANCE SPECIFICATION

2.1 Video Attenuators

Type of attenuator	Unbalanced "T"
Input/Output Impedance	75 ohm
Selection Range	0-10 dB in 1 dB steps

2.2 Meter Functions

Meter Movement	0-100 uA
Meter Impedance	1K ohm
Meter Scale	0-100 Black
	45-55 Green

Switch Positions

CARR DEV	(Black)
AFC ERR	(Blue)
CH 1 CARR	(Blue)
CH 1 DEV	(Blue)

	CH 2 CARR	(Blue)
	CH 2 DEV	(Blue)
	TRANSIT	(Black)
	+15 VDC	(Green)
	-15 VDC	(Green)
	-28 VDC	(Green)
	XMTR PWR	(Black)
	SYNTH	(Blue)
2.3	Audio Attenuators	
	Type of Attenuator	Balanced "U"
	Input Impedance	600 ohm
	Output Impedance	Depending on Load (Designed for 600 ohm)
	Selection Range	0-10 dB in 1 dB steps
2.4	Remote Fail Relay	
	Energizing Voltage	24 VDC Min.
	Contacts	Isolated, normally closed
2.5	Test Tone Oscillator	
	Output Impedance	$\leq$5 ohms
	Output Amplitude	0 - 9V p-p
	Supply Voltages	$\pm$15 VDC
	External Mute Terminal	Zone On E2 Open
		Zone Off E2 Ground

3.0 TECHNICAL DESCRIPTION

All meter driving voltages except +15 VDC, XMTR PWR and SIG STR are from 0 to a minus voltage. +15 VDC and XMTR PWR are from 0 to a plus voltage. SIG STR is from +.8 to a -15 VDC. The meter is protected by back to back diodes (CR1, CR2). Due to the $\pm$10% tolerance in the meter, impedance R1 is used to adjust the total impedance (the meter in parallel with R1 and R2) to the same value. The remote fail relay and alarm light are powered by the -28 volt unregulated.

The video attenuator (12011046) is a 75 ohm unbalanced "T" pad which is constructed on a three section, eleven position wafer switch to permit variations in attenuation from 0 to 10 dB in one dB steps.

The audio attenuator (12011042) is a balanced "U" technique. If the output of the attenuator is not terminated into 600 ohms, the attenuation steps will be incorrect. For this reason the attenuator's output is internally terminated by 600 ohms.

The DEV TEST switch and Hot-Standby switch are DPDT and SPST switches, respectively. The DEV TEST switch in the "OFF" position grounds the test tone inhibit line. When the switch is turned on, the ground is moved from the test tone inhibit line to the fault alarm buss. This energizes the Test Tone Oscillator and turns on the Alarm Light. The DEV TEST switch is normally left in the off position. The Test Tone Oscillator is used to provide a deviation test signal for the baseband and for FM subcarrier channels.

The Hot-Standby switch in the Standby position grounds one side of the RF Relay in the RF Module and the fail alarm buss. This switches the RF energy from the output connector to a dummy load and turns on the alarm light. In the hot position the switch removes the ground.

Both switches are installed but serve no function unless the option is requested by the customer.

The meter functions versus the pot number are as follows:

TRANSIT	No pot number
+15V	R1
-15V	R1
-28V	R1
XMTR PWR	R20
SYNTH	R17
CARR DEV	R16
AFC ERR	R13
CH 1 CARR	R12

CH 1 DEV	R9
CH 2 CARR	R8
CH 2 DEV	R5

4.0 OPERATING PROCEDURE

If the Remote Fail Relay is not required, R25 is 560 ohm, 1W. If the Remote Fail Relay is required, R25 is 82 ohm, 1W. The relay contacts are normally wired closed.

If the audio channels ordered have a 75 ohm input and output impedance, the attenuators will be the same type as the video attenuator.

During shipment, the meter should be left in the transit position.

12011644 - TRANSMITTER BASEBAND MODULE

1.0 INTRODUCTION

The Baseband Module (see Figure 1) contains the invert/non-invert amplifier, the strap attenuator and the summing network along with any of the following optional circuits: the pre-emphasis, low pass filter, two FM subcarrier oscillators, and a variable amplitude equalizer. A biternary subcarrier option consisting of a data AGC card and a biternary subcarrier modulator card may be used in place of the two FM subcarriers.

2.0 PERFORMANCE SPECIFICATIONS

2.1 Electrical

2.1.1	Baseband Input/Output Impedance:	75 ohm unbalanced
2.1.2	Baseband Input Level:	-2.8 dBm nominal
2.1.3	Baseband Output Level:	-3.8 dBm dependent on strap attenuator setting
2.1.4	Baseband Frequency:	5 to 15 MHz $\pm$.1 dB customer option
2.1.5	Audio Input Impedance:	600 ohm balanced-to-ground
2.1.6	Audio Input Level:	0 dBm nominal
2.1.7	Subcarrier Generators Output Level/Impedance:	+10 dBm @ 600 ohms
2.1.8	Audio Frequency:	50 Hz to 10 KHz $\pm$ 1/2 dB nominal

2.2 Environmental

2.2.1	Temperature:	-20°C to +65°C
2.2.2	Humidity:	95% @ 25°C
2.2.3	Altitude:	To 4600 meters (15,000 ft.)

3.0 TECHNICAL DESCRIPTION

3.1 The Inverting/Non-Inverting Amplifier (12011010) provides a nominal 14 dB of gain into 75 ohms. The signal phase at the output is

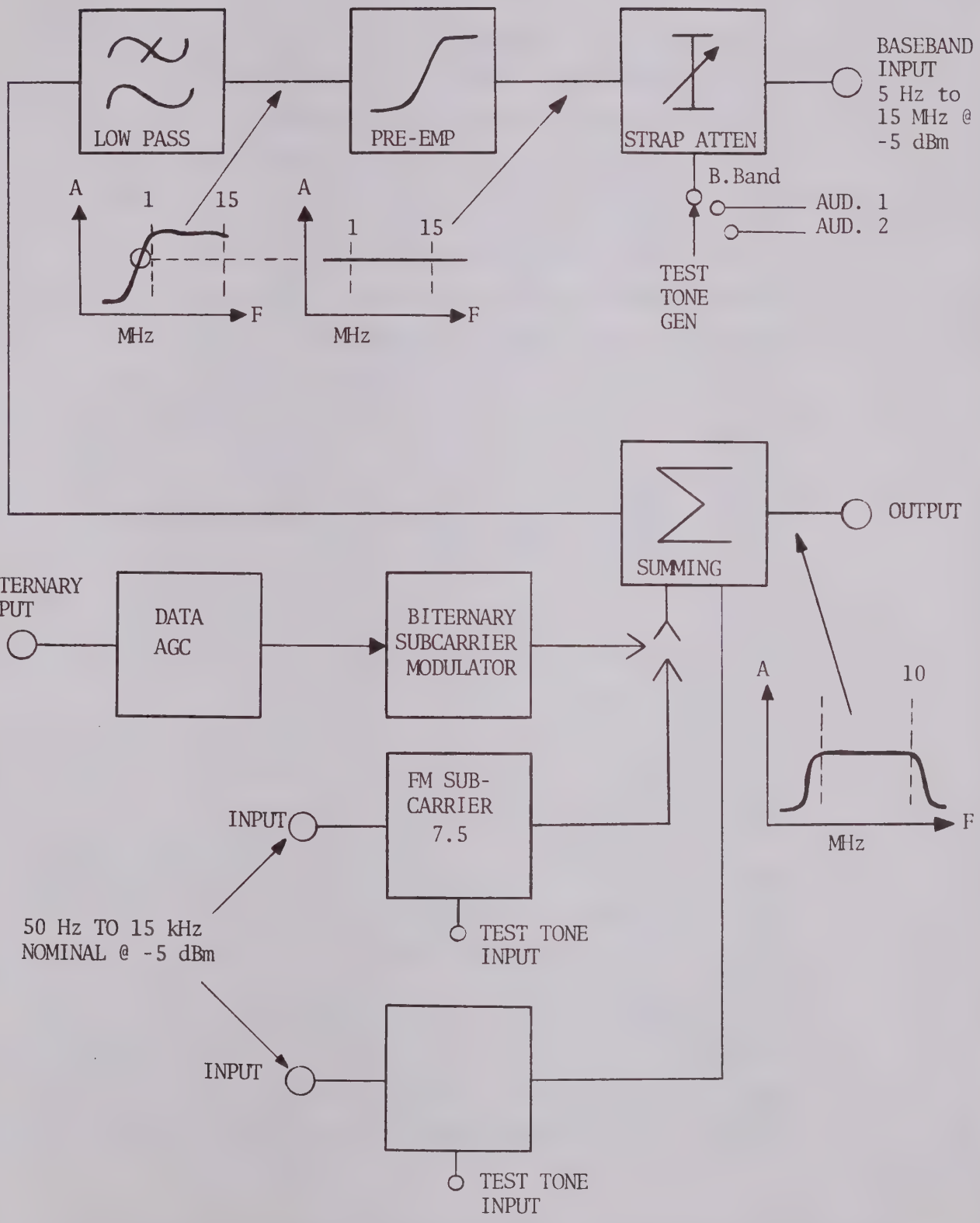


FIGURE 1: BASEBAND MODULE BLOCK DIAGRAM

selected by means of a U-Link. The U-Link is normally placed in the non-invert mode. The output level is adjusted to -3.8 dBm for proper signal level drive to the RF Module.

3.2 The Strap Attenuator (12011573) is composed of six 75 ohm constant resistance T pads and one straight through connection. Attenuations from 0 dB to 15 dB are attained by placing the U-Links in their respective positions.

3.3 The Pre-emphasis Network (12011024) is a symmetrical 75 ohm constant resistance network which attenuates the lower baseband frequencies, and emphasizes the higher frequencies (500 KHz to 15 MHz). This network is designed in accordance with CCIR recommendations.

3.4 The Low Pass Filter (12011032) is a five element, two T section Butterworth filter. Its purpose is to pass all baseband frequencies (50 Hz to 15 MHz within $\pm$.5 dB) and attenuate all frequencies above the baseband range. Above cutoff, the frequency response falls off at greater than 30 dB per octave. The low pass filter is used to limit the baseband response and prevent higher frequency noise from entering the system. The type of low pass filter used is optional with the customer.

3.5 The Low Pass Elliptical Filter is designed to accept and pass electrical energy for all baseband frequencies (60 Hz to 4.5 MHz $\pm$0.5 dB) and attenuate all frequencies above baseband.

3.6 The Subcarrier Modulator (12011058) is a frequency modulated, free running oscillator used to multiplex audio or digital data above the video information on the baseband signal. The oscillator consists of three sections: an audio amplifier, FM generator, and an amplifier - filter. The audio amplifier is a balanced emitter coupled differential amp designed to present a balanced-to-ground input impedance of 600 ohms. A 75 microsecond pre-emphasis can be used with audio signals and is strapped in with a U-Link type switch. The output impedance is 75 ohms unbalanced and output level is normally +10 dBm.

3.7 The Summing Network (12011692) is a complex resistive network designed to present a 75 ohm impedance to all inputs and outputs. At the same time it sums together all incoming signals on one common buss.

3.8 The Variable Amplitude Equalizer (12011054) is a multiple RL and RC network having a bandpass response which will compensate for the loss characteristic of the 75 ohm coaxial cable which is used in the multiple conductor remoting cable. The baseband signal from the Baseband Module to the remoted transmitter RF Module is conducted over this coaxial cable.

4.0 OPERATING PROCEDURE

All signal levels are adjusted during final systems test and no further adjustments are necessary during normal operation.

12011645 - SYNTHESIZER MODULE

1.0 INTRODUCTION

The Synthesizer Module (see Figure 1) contains three printed circuits: a Crystal Holder (optional), a Crystal Oscillator, and a Lamp Driver. A fault light is mounted on the front panel to provide a visual indication of oscillator or synthesizer failure.

2.0 PERFORMANCE SPECIFICATIONS

2.1 Electrical

2.1.1	Frequency Range:	100 ±6 MHz
2.1.2	Power Output:	100 mW min.
2.1.3	Output Impedance:	75 ohms
2.1.4	Frequency Stability:	15 PPM
2.1.5	Fault Sensing Level:	15 mW

2.2 Environmental

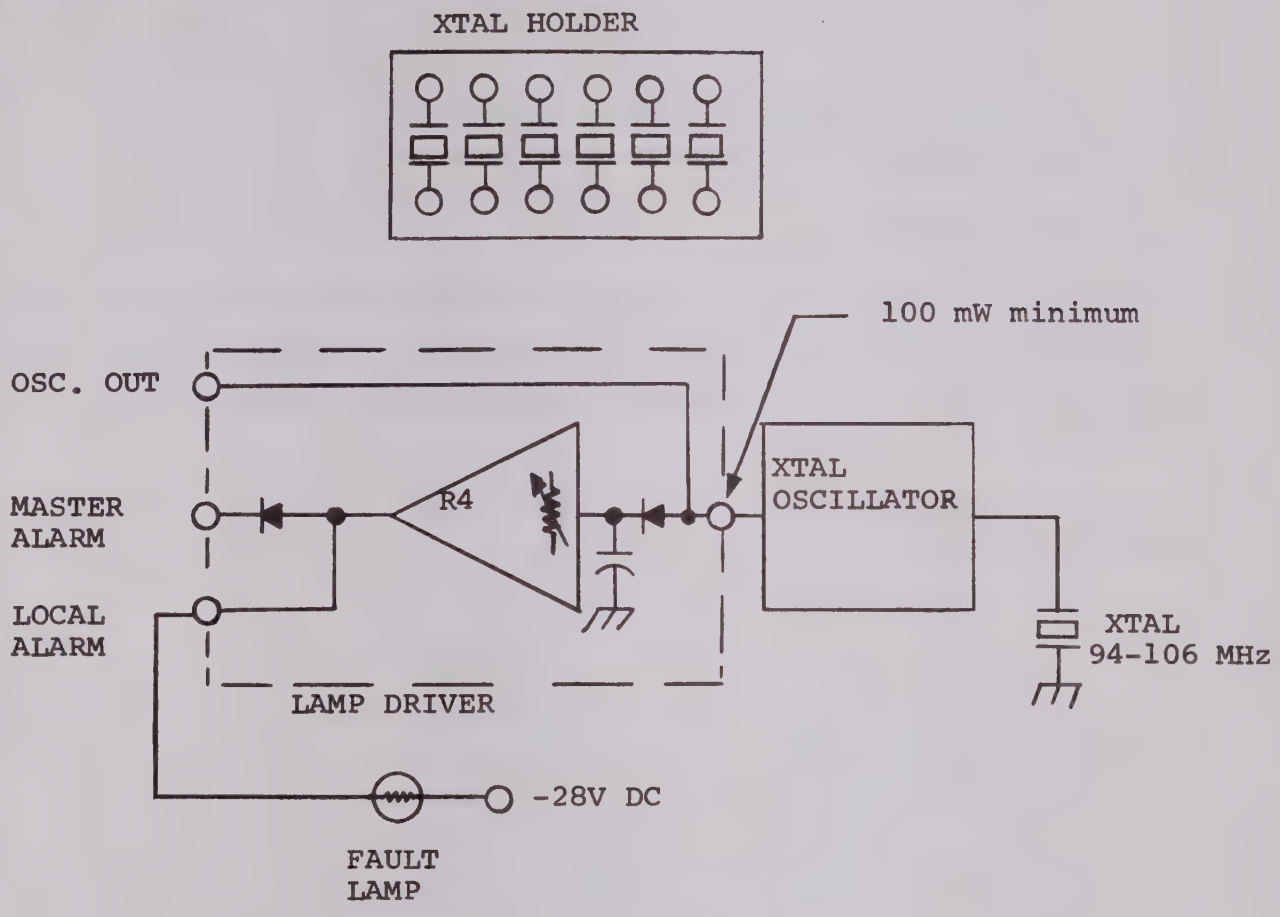
2.2.1	Temperature:	-20°C to +65°C
2.2.2	Altitude:	To 4600 meters (15,000 ft.)
2.2.3	Humidity:	95% @ 25°C

3.0 TECHNICAL DESCRIPTION

3.1 The optional Crystal Holder (12011045) consists of ten crystal sockets which are used to hold spare crystals for changing the frequency of operation.

3.2 The Crystal Oscillator (12011015) provides the crystal stable reference which is needed in theAFC loop to hold the output of the transmitter within a close frequency tolerance (50 ppm). The oscillator will accept crystals in the frequency range of 94 to 106 MHz.

3.3 The Lamp Driver Circuit (12011037) is identical to the Lamp Driver on the interface board (12011596) except that a diode detector is



NOTE: Fault sensing level is 15 mW adjustable by R4.

FIGURE 1

incorporated into the circuit to detect the 94 to 106 MHz reference signal from the local oscillator or synthesizer. The voltage output of the diode detector is approximately 150 millivolts for a 15 mW input. Resistor R4 is used to adjust the level at which the alarm light will illuminate and indicates the loss of the 100 MHz reference signal.

4.0 OPERATING PROCEDURE

Resistor R4 on Lamp Driver is adjusted to light the fault lamp if a signal level of 15 mW or less is present at the output of crystal oscillator. To obtain 15 mW add attenuation between the oscillator output and lamp driver input.

12011646 - TRANSMITTER AFC MODULE

1.0 INTRODUCTION

The AFC Module (see Figure 1) contains five printed circuits: the IF/Discriminator, Baseband Preamplifier, De-emphasis, Baseband Amplifier, and the Automatic Frequency Control Circuit.

2.0 PERFORMANCE SPECIFICATIONS

2.1 Electrical

2.1.1 Discriminator

Input Frequency:	70 ±5 MHz
Input Level:	-23 to -3 dBm (-13 nominal)
Output Level:	30 mV/MHz (.3V p-p nominal)
Supply Voltages:	-15 ±.5 VDC

2.1.2 Preamplifier

Input Level:	.5V p-p (nominal)
Input Impedance:	Approximately 600 ohms
Output Level:	1V p-p nominal
Output Impedance:	75 ohms
Supply Voltages:	±15 VDC

2.1.3 AFC

Input Level:	1.5 VDC max. (K-.1V/MHz) ±.25V (nominal)
Time Constant:	Less than 1 sec.
Muting Input:	0 to -1.5 VDC
Output Swing:	Dual Phase -1 to -15 VDC (-6.0 VDC nominal)
Supply Voltages:	±15 and -28 VDC
Fault Level:	0 VDC at muting input or AFC switch to disable

2.1.4 De-emphasis: To CCIR recommended standards

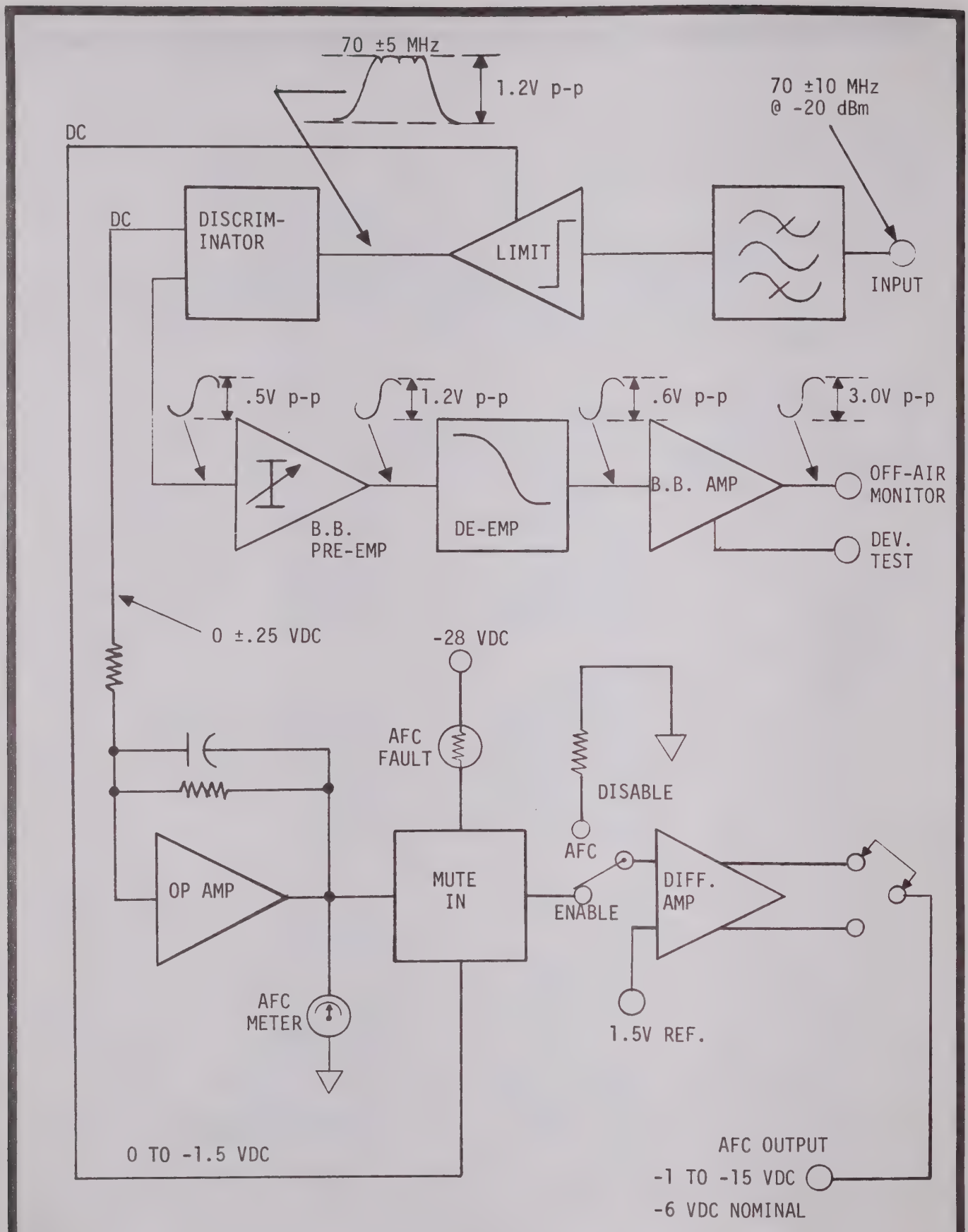

70 ±5 MHz
1.2V p-p
70 ±10 MHz
@ -20 dBm
DC
DC
DISCRIM-
INATOR
LIMIT
INPUT
.5V p-p
1.2V p-p
.6V p-p
3.0V p-p
B.B.
PRE-EMP
DE-EMP
B.B. AMP
OFF-AIR
MONITOR
DEV.
TEST
0 ±.25 VDC
-28 VDC
AFC
FAULT
DISABLE
AFC
OP AMP
MUTE
IN
ENABLE
DIFF.
AMP
AFC
METER
1.5V REF.
0 TO -1.5 VDC
AFC OUTPUT
-1 TO -15 VDC
-6 VDC NOMINAL

FIGURE 1

2.1.5 Baseband Amplifier

Input/Output Impedance:	75 ohms
Input Level:	
Output Level:	1V p-p (Nominal)
Supply Voltages:	±15 VDC

2.2 Environmental

2.2.1	Temperature:	-30°C to +65°C
2.2.2	Humidity:	95% @ 25°C
2.2.3	Altitude:	To 4600 meters (15,000 ft.)

3.0 TECHNICAL DESCRIPTION

3.1 The IF/Discriminator (12011008) accepts a 70 MHz FM signal (difference between transmitter modulator, or VCO, and the reference oscillator) from the RF Module. It filters, amplifies and converts any frequency change to a DC voltage. The error voltage which is proportional in amplitude and phase to the error frequency is fed back to the VCO to stabilize the transmitter frequency. The output of the discriminator is also connected to a baseband preamplifier; there the FM signal is processed and used for an off-the-air monitor.

3.2 The main function of the Baseband Preamplifier (12011039) is to maintain a constant output level with a 6 to 1 variation in baseband input level. This is accomplished by rotating a U-Link switch at the input to vary the gain in six (6) equal steps. Since all RF Modules are designed to deviate 4 MHz peak for 0.5 volt peak of baseband signal, the amplitude of the baseband signal from the discriminator can vary 6 to 1 depending on the number of times the approximate 2 GHz voltage controlled oscillator (VCO) is multiplied.

3.3 The De-emphasis Network (12011026) is a symmetrical 75 ohm constant resistance network which attenuates, or de-emphasizes, the higher baseband frequencies (500 kHz to 15 MHz) and passes the lower baseband frequencies (50 Hz to 500 kHz) in accordance with CCIR specifi-

cations. When used with a companion pre-emphasis network, the de-emphasis restores the previously emphasized baseband response to its original flat (±.25 dB) response.

3.4 The Baseband (Video) Amplifier (12011001) is an AC-coupled gain stage used in the frequency range of 2.0 Hz to 15 MHz with adjustable gain of approximately 0 to 10 dB. The input and output impedances are 75 ohms. The amplifier is used in both transmitter and receiver to raise signal levels of baseband information. The application for which it is used in this case is two-fold: as an off-the-air monitor to provide a sample of the signal which is being transmitted (its level should correspond to the baseband input level), and as a deviation detector to set the modulation level.

3.5 The main function of the AFC circuit (12011014) is to receive DC information from the IF discriminator then filter, amplify and isolate this signal so that it may be applied to a voltage controlled oscillator (VCO) to reduce frequency errors (relative to zero discriminator output) caused by changes in line voltage, temperature, and aging of components.

4.0 OPERATING PROCEDURE

All critical levels are adjusted at the factory, and no further adjustments are necessary during normal operation.

12011647 - DIGITAL FREQUENCY SYNTHESIZER

1.0 INTRODUCTION

The TerraCom TCM-6DS, Digital Frequency Synthesizer, provides frequencies from 93 to 103 MHz in 1 kHz increments by setting internal thumbwheel switches. The accuracy of the output is controlled by a stable crystal oscillator within 10 PPM accuracy over the full temperature operating range.

The module is packaged in a 9.1" x 4.8" x 2.0" cast aluminum housing and is intended to be used on the frequency source for the TerraCom TCM-6 transmitter.

2.0 SPECIFICATIONS

2.1 Electrical

Input:	+5V @ 550 mA, +15V @ 20 mA, -15V @ 80 mA, -28V @ 30 mA
Frequency:	93 MHz to 103 MHz in 1 kHz steps
Output Level into 75 ohm:	Locked 2V rms, unlocked .25V rms
Lockup Time:	<5 seconds
Indicator:	Front panel lamp lights to indicate unlocked or fault condition

2.2 Mechanical

Size:	9.1" x 4.8" x 2.0"
Weight:	2 pounds
Frequency Set:	One slide switch plus four thumbwheels

2.3 Environmental

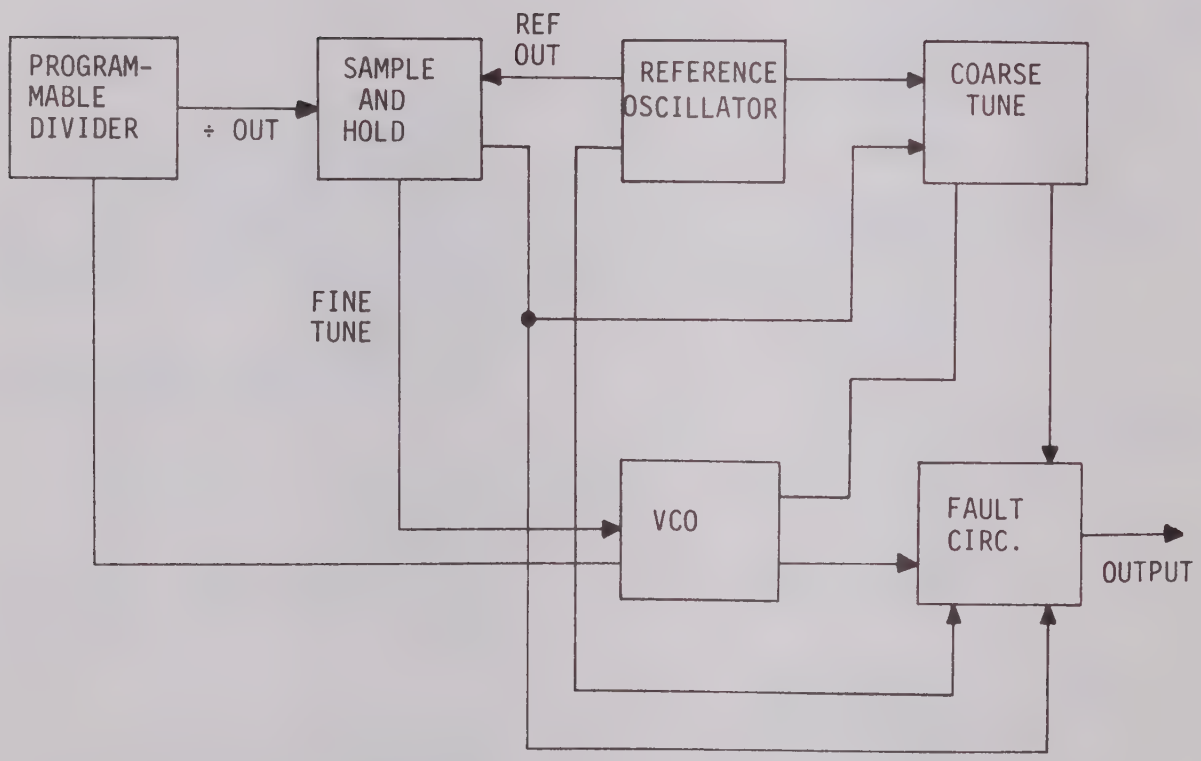
Temperature:	-30°C to 70°C
Humidity:	To 95% @ 25°C and 4600 meters (15,000 ft.) altitude

3.0 TECHNICAL DESCRIPTION

Overall theory of operation is presented followed by detailed theory of each of the four circuit boards. Schematics for the individual circuit boards can be found in the TCM-6 Maintenance Manual.

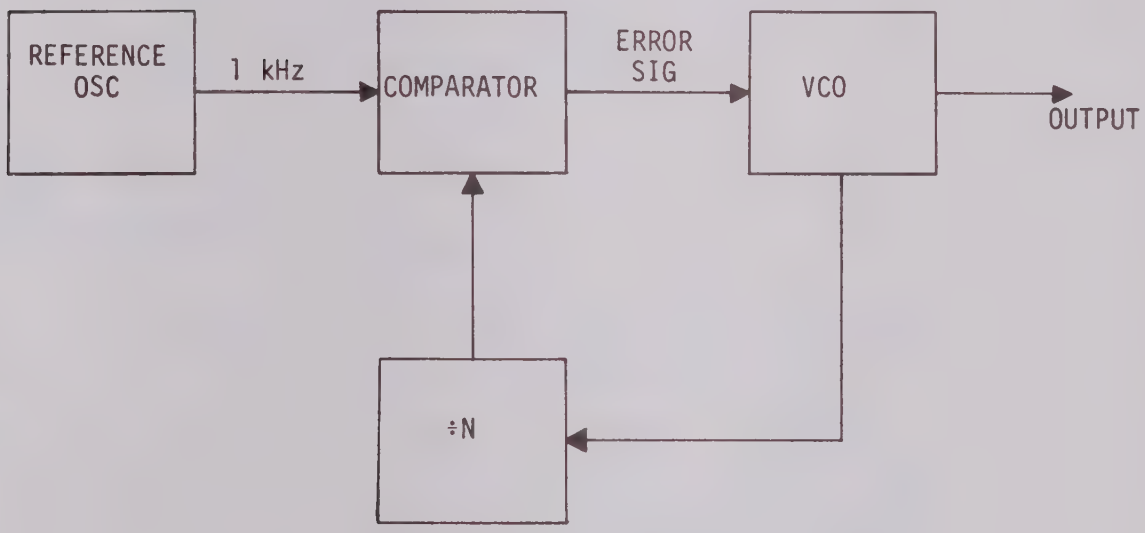
3.1 Overall Function

The synthesizer consists of the six major circuit blocks depicted below:



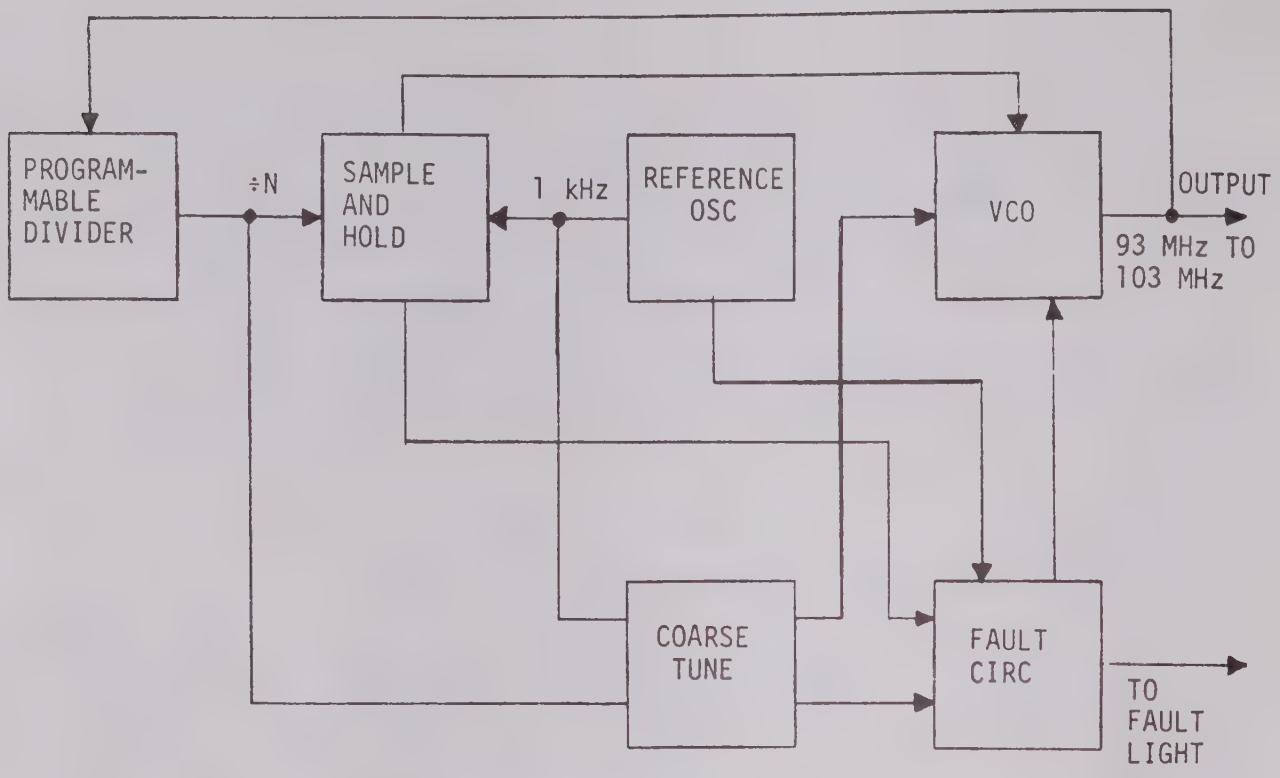
The objective is to control the VCO (voltage controlled oscillator) over a wide range of frequencies with the accuracy of the fixed frequency reference oscillator. This is done by comparing the VCO output frequency after division to the reference frequency. A voltage is produced by the comparator and fed back to the VCO to maintain zero frequency difference between the two.

The diagram below shows a simple synthesizer block diagram:



As an example, let the divider divide by 100. In this case, the VCO must be 100 kHz since the error signal will control the VCO frequency up or down until the divider output frequency equals 1 kHz. If the divider is set to divide by 101, the comparator will produce an error signal sufficient to raise the VCO output to 101 kHz thereby matching the reference frequency of 1 kHz after dividing by 101. It can be seen that frequencies in 1 kHz steps can be produced at the VCO output. The accuracy of the output will be the accuracy of the reference oscillator since the ratio of the two are held exactly.

The block diagram is shown for the TerraCom model.



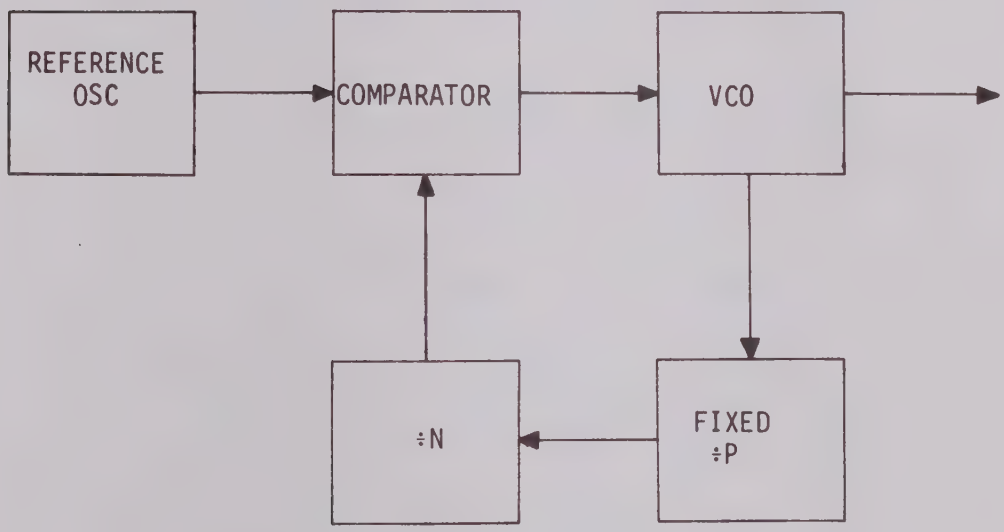
The programmable divider divides the VCO output down to 1 kHz which is fed into the sample and hold phase detector. The highly stable 1 kHz from the reference is also connected into the phase comparator. Since the phase comparator does not respond to frequency differences, the VCO capture range would be small. To improve upon this, a coarse tuning circuit is employed. The coarse tuning circuit samples the divider and reference signals and produces a digital voltage ramp that sweeps the VCO throughout its frequency range. When the VCO frequency (after dividing by N) matches the reference frequency, the coarse tune circuit stops changing the VCO and holds it at the established frequency. At the same time, the phase comparator fine tunes the VCO to phase lock the VCO to the reference. The coarse tune circuit remains in this state until the programmable divider is changed sufficiently to break lock with the phase comparator.

The fault circuit samples the output of the programmable divider, reference oscillator, and frequency comparator. If all signals are

present, the VCO output is enabled and the fault light turned off. If any of the three inputs are incorrect, the VCO output is inhibited and the fault light turned on.

3.2 Programmable Frequency Divider 12010040

In the above example, the divider was operating at the VCO output frequency which was low, approximately 100 kHz. The TCM-6DS synthesizer VCO operates in the 100 MHz range which somewhat complicates its implementation. Programmable dividers are not available above approximately 30 MHz. There are several solutions to this problem. One is to use a non-programmable high speed ECL prescaler to reduce the VCO frequency to less than 30 MHz.



This scheme has one undesirable feature. The output of the reference oscillator must be divided also by the division of the prescaler. This causes the frequency within the loop to be lower than the channel spacing and results in a much slower response time. To overcome this shortcoming, a high speed dual modulus prescaler is used between the VCO and first programmable divider. This, in conjunction with a

modulus control counter, allows the reference to remain at 1 kHz and yet the programmable dividers see the VCO frequency divided by the prescaler. The programmable dividers have a top frequency limit of 8 MHz. With the VCO operating at the high end of its range, approximately 103 MHz, the prescaler would have to divide by at least 13 to be at the upper limit of the programmable counter. High speed prescalers are not available with moduli above 12. This poses the problem of reliability in operating the programmable counter above its design limit. The solution used here is to use a high speed dual modulus prescaler with moduli of 10 and 11 and a frequency extending device on the programmable dividers. This frequency extender consists of a network of gates to detect the counters zero and two state outputs. This allows a much longer time to preset the counters thereby increasing their speed to approximately 25 MHz. Referring to the programmable divider schematic, in the TCM-6 Maintenance Manual, the operation is as follows:

The signal from the VCO enters at terminal E2. Z1 serves the purpose of level limiting to provide the proper drive level for Z2. Z2 is the high speed dual modulus prescaler. This counts with a modulus of 10 or 11 depending on the logic state of pins 9 and 10. A portion of Z8, in conjunction with the first programmable counter Z3, controls how many times Z2 divides by 11 before it begins to divide by 10. To further understand how the divider operates, consider the case where the thumbwheels and switch are set to divide by 97642. The least significant digit (2) is the preset of Z3 which controls the modulus of Z2. As pulses enter Z2, it divides from 11 to zero. When it reaches zero, it decrements Z2 by one, and Z1 begins to divide again by 11. When Z2 again reaches zero, it decrements Z3 to zero. Whenever Z3 has been decremented from its preset to zero, it produces an output and sets Z2 to divide by 10 until all programmable counters are again present to the numbers on the thumbwheels. The table on the following page shows the count sequency for the com-

plete divider chain for the preset number 97642.

10,000	1,000	100	10	Units
9	7	6	4	2
Z7	Z6	Z5	Z4	Z3

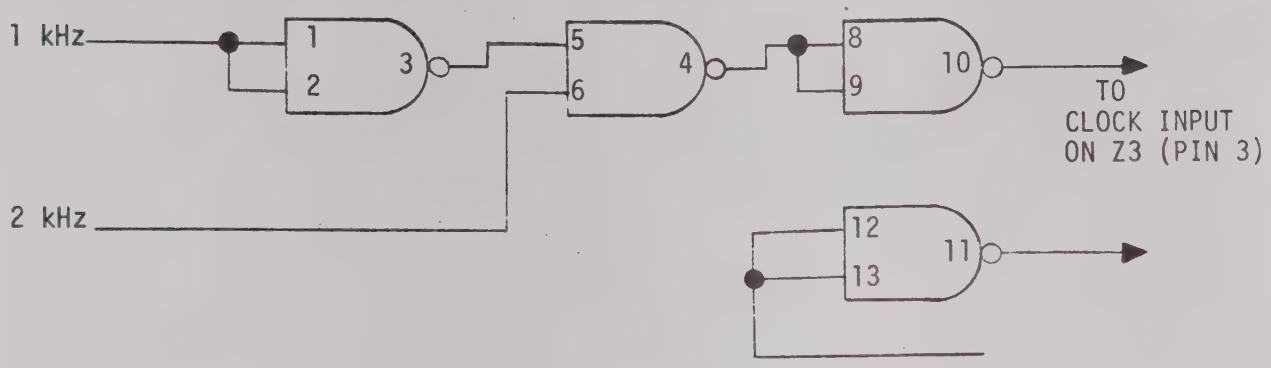
Z3 causes Z2 to divide by 11 twice before Z3 is decremented to zero. Each time Z3 is decremented, Z4 is also decremented. At the end of Z3 input pulses, Z4 is decremented to 2, and 20 more input pulses are required to decrement it to zero since Z2 is now dividing by 10. As Z4 becomes zero, it decrements Z5, and Z4 begins to divide by 10. It can be seen that the number of input pulses required to decrement Z7 to zero will be 22 + 20 + 600 + 7000 + 90000 which equals 97642. When Z7 reaches zero, all dividers are again preset and the sequence repeats. The output is the short duration reset pulse taken from pin 9, Z8.

3.3 Reference Oscillator and Coarse Tune Board 12010042

The reference oscillator consists of a temperature stabilized crystal with its associated circuits in a sealed enclosure. There is a frequency adjustment accessible through a hole in the side of the enclosure. The oscillator supplies a very stable reference frequency of 4.096 MHz with the proper level to drive the 12 stage CMOS binary divider Z1. Z1 divides by 2^{12} which equals 4096, reducing the oscillator to 1 kHz. This 1 kHz output is supplied to the sample and hold circuit and a connector contact at the rear of the module.

The remaining circuitry on this board is the coarse tuning circuit. The coarse tune circuit produces a sawtooth ramp voltage from 0 to 15 volts in approximately five seconds when the divided VCO signal and the reference signal are not in lock.

Z2 is a quad 2- input nand gate and is connected as shown on the following page:



The 1 kHz input is from the reference divider Z1 output and the 2 kHz from the next to last output divider section of Z1. The 1 kHz signal is inverted with the first gate of Z2 and fed into the second section along with the 2 kHz signal. The output of the second gate is positive going pulse with a 25% duty cycle and the negative going edge shifted 90° from the positive going edge of the 1 kHz signal. This is then inverted by the third section of Z2 and used to drive the clock input of Z3 which requires a positive transition to transfer. Flip flop Z3 toggles on clock pulses whenever the asynchronous reset input pin 4 is logic zero.

The input at E3 is the stretched divider output pulse from the reset-table multivibrator on the sample and hold board. This signal is inverted and the level translated from TTL to CMOS by transistor Q1 and applied to pin 4 on Z3. Z3 functions at a phase comparator for the coarse tuning circuit. Whenever the reference signal on the clock input of Z3 is not at the same frequency as the programmable divider signal at the reset input of Z3, Z3 toggles and drives the binary counter Z4. If the two inputs are at the same frequency and within proper limits of phase displacement, Z3 ceases to toggle. Z3 is a dual JK flip flop with the first section used as a phase and frequency detector. The second section is used to divide its output by two. The output of the second section is then divided by four in the two first sections of the 12 bit binary counter Z4. This is then

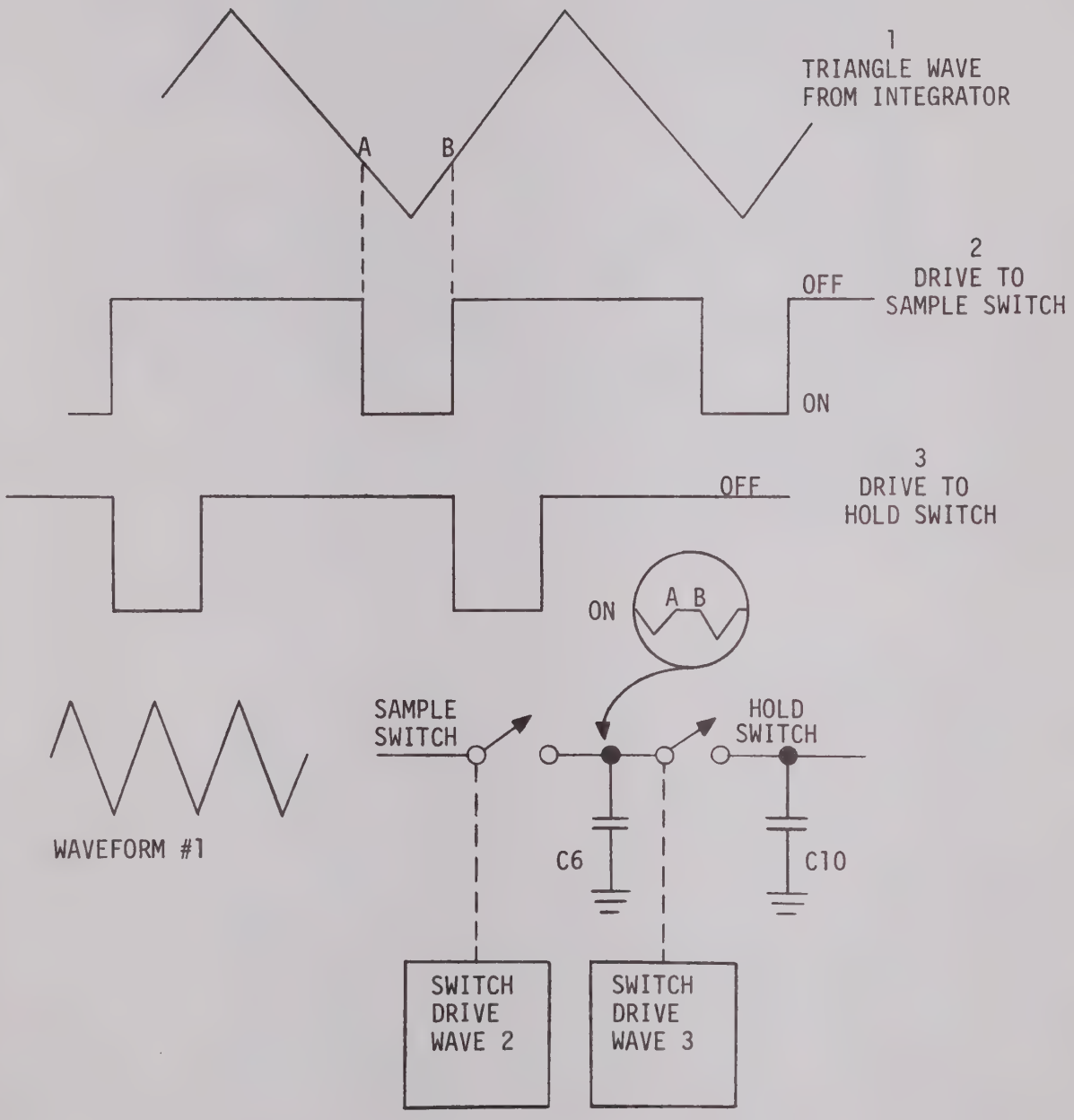
divided by 29 in the next nine stages of Z4. The last nine stages have their outputs connected to a resistive ladder. The output of the ladder is a voltage ramp that cycles from 0 to 25 volts in 1024 increments in approximately five seconds. This ramp is used to sweep the VCO into the lock range of the fine tune phase comparator. Q2 is used as an input activity detector for fault detection.

3.4 Sample and Hold Phase Comparator 12010173

The 1 kHz reference signal enters at E1 and drives the base of Q1 causing it to switch from off to saturated with each incoming reference cycle. This squarewave is integrated by R3 and C3 to form a triangle wave. Q2, Q3, and Q4 amplify and level shift the triangle wave. It is this triangle wave that will be sampled to derive the voltage for VCO fine tuning.

The waveforms of the sample and hold circuit at lock are shown on the following page.

The waveforms of the sample and hold circuit at lock are shown below:



It can be seen from the timing diagram that the sequence of events are: (1) sample switch closes, and the voltage on C6 follows the triangle voltage; (2) the sample switch opens retaining the charge on C6; (3) the hold switch closes transferring any differences of charge from C6 to C10; and (4) both switches open for the remainder of the cycle. The switch drive signals must be derived from the very short pulse from the programmable divider. Z2 is a dual retriggerable monostable multivibrator which when triggered produces an output pulse determined by the time constant of R11, C8. The short pulse from the divider triggers the first section of the multivibrator and produces a sample switch drive pulse of approximately 400 μs. The end of the first pulse triggers the second multivibrator, and it produces hold switch drive pulse of approximately 400 μs. At the end of the second pulse, both drive signals remain off for the remainder of the cycle (approximately 200 μs).

Z1 is a dual bidirectional MOS switch including drives. Drive signals from pins 13 and 12 of Z2 connect to pins 10 and 12 of Z1 causing it to perform the sample and hold function. Its function is to present an extremely high impedance to the output of the hold capacitor so that all increases or decreases in its charge must be through the bilateral switches. The switches have a small amount of inherent junction capacitance causing some energy feed-through during the switching transition. To nullify this effect, the output is filtered by R14, 16 and C11.

3.5 Voltage Controlled Oscillator (VCO) and Fault Circuit 12010166

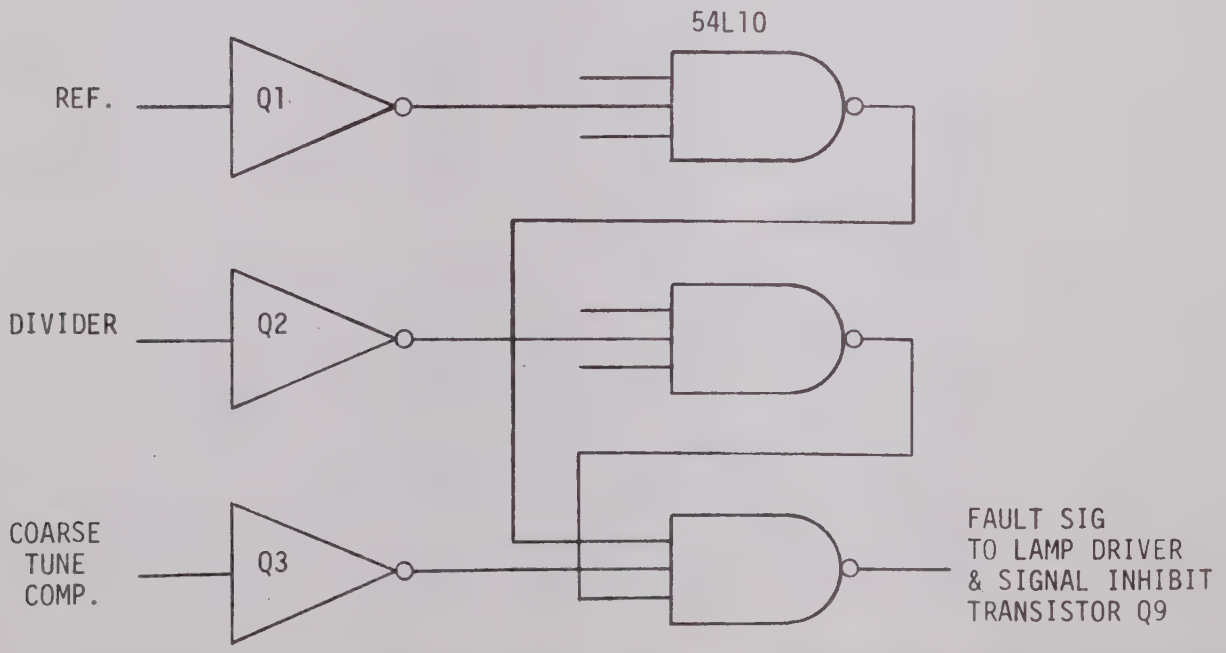
Q7 in conjunction with its associated components form the Voltage Controlled Oscillator. R22 and R32 supply the proper bias. VVC1, VVC2, C14, C13, and L1 form the tank circuit. Feedback is supplied by C16 to Q7 emitter. The fixed capacitor C18 controls the amount of feedback. The frequency of the oscillator is determined by the tank circuit. VVC1 and VVC2 are varactor diodes, and as voltage is applied to their cathodes, their capacitance varies causing the

oscillator frequency to change.

Q8 is a broadly tuned amplifier capacity coupled to the oscillator by C17. The input to the programmable counter is coupled to the collector of Q8, and the output amplifier stage is connected to its emitter. The collector of Q10 is coupled to the output terminal through L6 which matches the impedance of the collector to the output load. Q9 connects the base of Q10 to ground whenever it is desired to inhibit the VCO output. This reduces the level 20 dB. K1 relay on the output then terminates and opens the path for a total of 50 dB.

The fault detection circuit samples three circuit functions: programmable divider output, reference oscillator output, and the output from the coarse tune phase detector. If signals are not present from the first two, or pulses are present from the phase detector, the VCO output will be inhibited and the fault lamp on.

Q1, Q2, and Q3 are all identical circuits. They integrate the incoming pulses and produce a DC level to drive the fault circuit logic. The logic is shown below:



If the output of the VCO is in lock, the integrated pulses from the reference and divider will be present and cause the integrator/amplifier outputs to be logic 0. When lock occurs, the input to phase comparator integrator goes to zero, resulting in a logic 1 at its integrator/amplifier output.

A zero is needed at the output of Z1 at lock conditions. Since a nand gate is used, it is necessary to have logic ones on the inputs to gate 3 (pins 9, 10, 11). Since the outputs of the first two integrator/amplifier are 0, it is necessary to invert. This is done with the first two gates. It can be seen that with the loss of the reference or divider signal or the presence of a phase detector signal, the output of Z1 will become a logic one. When a fault exists, Z1 supplies a logic 1, which drives the base of Z4 positive. As Q4 conducts, the emitter of Q5 is pulled to ground and Q5 is turned off. Resistor R18 pulls the bases of Q6 and Q9 negative turning them on. Q9 shifts the bias point of Q10 and also shuts the base drive signal causing the VCO output to drop approximately 20 dB. Q6 drives the fault light and supplies a remote fault signal at the plug on the rear of the module. When no fault exists, the output of Z1 becomes a zero turning Q6 and Q9 off. K1 relay coil is across the fault lamp. Under normal operation it is de-energized.

4.0 OPERATION

The synthesizer requires only the setting of the frequency set switches to the desired output frequency for operation in the TCM-6 system. The frequency setting is made by removing the right side cover and setting the slide switch and the four thumbwheel switches to the desired frequency.

12010984/12013060 - TCM-610 TRANSMIT DATA MODULE

1.0 INTRODUCTION

The TCM-610 Data Module allows the transmitter to operate as a digital radio by accepting digital information and converting it to a biternary signal for modulation. To accommodate different types of input data, various interface boards are available to accept either coded or uncoded signals. Because the module produces an RF spectrum in the transmitter that is not rich in harmonics, an RF filter is not required and the radio can be field tunable.

2.0 SPECIFICATIONS

Fixed Rate Units

Standard Data Rates		1.544 Mb/s AMI 2.048 Mb/s HDB3 6.312 Mb/s B6ZS 8.448 Mb/s HDB3 12.5526 Mb/s NRZ 12.928 Mb/s NRZ	
Optional Data Rates		Up to 13 Mb/s	
Standard Data Formats			
Format	Impedance	"1" Level	"0" Level
NRZ	75 ohm bal	+2V ±.2V	-2V ±.2V
	75 ohm unbal	+2V ±.2V	-2V ±.2V
	75 ohm unbal	TTL Logic Levels	
	50 ohm unbal	0V ±.15V	-1.5V ±.15V
AMI	110 ohm bal	+3V ±.3V	0V ±.3V
B6ZS	110 ohm unbal	+4.2V ±.4V	0V ±.4V
HDB3	75 ohm unbal	+2.37V ±.2V	-2.3V ±.2V
	120 ohm unbal	+3V ±.3V	-3V ±.3V
Optional Data Formats		Contact Factory	

Switchable Rate Units

Standard Data Rates	.512/1.024/2.048 Mb/s .576/1.152/2.304 Mb/s
Optional Data Rates	Up to three different harmonically related rates in each module. Timing must be supplied by customer.
Data Formats	Contact Factory

General

Transmitter Bandwidth	Approximately equal to data rate (1 bit/Hertz)
Note: Switchable rate units will	occupy bandwidth equal to highest rate.
Threshold for 1 x 10^6 BER	-75 dBm to -81 dBm depending on data rate and microwave band, e.g., TCM-613 @ 6.312 Mb/s, -80 dBm
Lock Range	$\pm$50 ppm
Monitors	LED indications of data status and unit fault
Adjustments	None required. Units can be plugged into existing TCM-600 video or FDM systems.
Modulation Method	Biternary employing partial response FM.

PC2B Orderwire Option

Frequency	3 kHz
Input/Output Impedance	600 ohms

3.0 TECHNICAL DESCRIPTION

See Wiring Diagrams 12010984 or 12013060.

The function of the Transmit Data Module is to accept the supplied input data, convert it to a TTL signal for use within the module and finally translate it to a partial response FM or Biternary signal which may be used to modulate the transmitter. To accomplish this the module must create timing consistent with input data. In addition the signal must be randomized to maintain activity on the transmitter even when no input data is present.

The Transmit Data Module may accept many different types of data such as NRZ, AMI, B6ZS or HDB3. This versatility is accomplished by the use of different interface converter boards designed to be compatible with the incoming signal.

In the case of uncoded data such as NRZ, the data and timing are two separate, unbalanced signals which are received by the converter through BNC connectors on the rear of the radio. Reference Wiring Diagram 12010984.

Both signals are passed through slicer circuits and converted to TTL data and timing. The TTL data signal is then applied directly to the Data Mixer.

The processing of the timing employs two additional cards. These are the Timing Source Relay and a Reference Oscillator which operates at the data rate. Timing must be applied to the circuit at all times to maintain a system reference, even when no input data is present. Normally, a sample of the system clock is supplied by the customer. This signal is passed directly from the converter through the Timing Source Relay to become the clock for the Data Mixer. So long as this timing signal is available it is the system clock. If the timing signal is not supplied, a fault situation occurs lighting the red fault light on the front of the module. When this happens the Timing Source Relay switches to the Reference Oscillator which then becomes the source for the system timing signal.

Input data may or may not be present. If data is present the green indicator light on the front of the module will be on. If not the light will be off.

If the input to the Data Module is in a coded format such as B6ZS, HDB3 or AMI, only one PC card is required for data conversion. Referring to Wiring Diagram 12013060, it can be seen that the coded data enters the module as a balanced signal through appropriately labeled balanced connectors at the rear of the module and goes directly to the Data Converter. The Data Converter then removes any bipolar violations in the signal and converts it to TTL. At the same time a separate circuit samples the input data and applies it to a phase locked loop whose output controls a voltage controlled crystal oscillator (VCXO). This VCXO then becomes the internal TTL timing signal. Even if data input is removed, the VCXO supplies a free running clock for system timing.

As before, front panel lights indicate system operation. The green panel light indicates input data activity, and the red panel light indicates a system fault.

In addition to standard single rate units, a switchable data rate module is also available. In a switchable data rate module there are two requirements.

The first is that all data rates must be harmonically related by factors of two. Secondly, the radio will always operate at a system clock equal to the highest data rate of the incoming signal. This switchable data rate module is limited to a maximum of three data rates.

All Data Converter circuits, whether coded or uncoded data, have the primary purpose of generating system TTL data and clock. Beyond the converter all Data Module circuits are basically the same. The TTL signal from the converter is passed to the Data Mixer which is a 2^{15} -1 pseudorandom word generator with data mixing capability. The purpose of the Data Mixer is to maintain activity in the circuit regardless of input. This activity ensures that the transmitted spectrum will always have a random noise characteristic whether or not input data is present.

The output of the Data Mixer is then passed through a TTL to NRZ converter board. This board will have an open circuit symmetrical output of 2V p-p and, when terminated into a resistive 75 ohms, 1V p-p symmetrical on 0 VDC.

The next step in processing the data signal is to shape this signal into a form which may be used to modulate the transmitter. This is accomplished by passing the signal through a Gaussian response low pass filter whose cutoff frequency is equal to 1/4 of the data rate. This filter severely cuts off the data and produces a partial response waveform known as Biternary FM.

A detector on the filter board verifies the 1V p-p signal level which is indicated as a green zone meter reading denoted as "CARR DEV". A Strap Pad Attenuator after the filter is set to produce the exact deviation for the proper spectrum.

A Gaussian response filter is used because it best matches the noise characteristics which will be present in the receiver. This noise follows a statistical Gaussian distribution. Therefore, a Gaussian response filter in the receiver will give the best noise rejection. By shaping the data in the transmitter with the same response, the optimum S/N can be obtained.

Finally, a Summing Card passes the signal while allowing the introduction of an analog subcarrier if desired. This subcarrier option permits the addition of a radio service channel to the transmitted signal.

The signal from the Data Module is then applied to a transmitter. Because the signal is without harmonic energy due to its smooth characteristics, it produces a spectrum in the transmitter that is not rich in harmonics; this precludes the necessity of an RF filter and allows the transmitter to be field tunable. The resulting transmitted RF spectrum has a 1 bit/Hz bandwidth efficiency or, more simply, it has 99% of its energy content within a bandwidth equal to the data rate in MHz.

4.0 OPERATING PROCEDURE

The Data Module directly replaces the transmitter's analog Baseband Module and requires no special adjustment or modification of the radio. During operation front panel lights indicate system activity and faults. It should be noted that although the signal from the data module passes through the Control Monitor Module, the attenuators on the Module are bypassed and are not functional during data operation.

SECTION 5

MAINTENANCE

5.1. GENERAL INFORMATION

TerraCom recommends that field service on the TCM-6 Microwave Radio be confined to fault determination on a module or circuit board level. Malfunctioning units should be returned to the factory for repair. Spare modules or circuit boards may be stocked for rapid fault correction.

This section contains the following parts:

Paragraph 5.2 Maintenance Procedure
Paragraph 5.3 Audio Program Channel Test
Paragraph 5.4 Troubleshooting Techniques
Paragraph 5.5 Test Requirements Specifications

A wiring diagram of the complete radio can also be found at the end of this section.

Users who intend to perform component level corrective maintenance may order the TCM-6 Maintenance Manual. This volume contains a complete set of detailed circuit descriptions (DCD's) and test requirements specifications (TRS's) as well as parts lists and schematics for all PC boards used in both the transmitter and receiver.

A Final Test Procedure is used at the factory to check the performance of each system before shipment. This document describes turn-on, tuning and various test procedures. All important parameters are recorded and may be referred to for verification of proper operation. The Final Test Procedure is packed with the radio to ensure that it is available at the installation site. (Note that Final Test Procedure records the serial numbers of each module in the transmitter/receiver and applies only to these specific units).

5.2. MAINTENANCE PROCEDURE

The Maintenance Procedure is an abreviated Final Test Procedure and should be performed after installation and at 12 month intervals thereafter. The following test equipment (or equivalent) is required:

Power Meter (HP 435A)

Baseband Oscillator (HP 654A)

AC Voltmeter (HP 400EL)

Frequency Counter (Systron Donner 6016)
(Must cover frequencies up to 15 GHz)

Digital Multimeter

Spectrum Analyzer (Tektronix 491)

RF Millivoltmeter (Boonton 92BD)

TerraCom TCM-6 TCK Test Cable Kit

5.2.1. Preliminary Check

First look at the system configuration to determine what straps (U-Links) and Printed Circuits or Filters are inserted or deleted for the particular application (video, message, or data).

Make certain that all U-Links are in their proper positions (i.e., Preamplifier U-Link in AFC Module is in the proper multiplier position, pre-emphasis and De-emphasis are strapped etc.).

Turn on POWER SUPPLY and check the supply voltages for green scale reading.

Check BASEBAND Module to ensure Pre-emphasis is out, the Attenuator is set to 8 dB (if Cable Equalizer is used, 12011054, set the Attenuator to 2 dB), and the Summing Network U-Link is in storage position.

5.2.2. AFC Reference Voltage Adjustment

(a) Extend AFC Unit Disable AFC. Remove blue U-Link on the AFC Printed Circuit Board. Measure test points A to ground, then B to ground for 6.00V ±50 mV with a Digital Voltmeter. R34 adjusts this level. Then put the voltmeter leads across A and B and adjust R25 for 0 voltage output level. Recheck your 6V level again, you might have to go back and forth a few times to get accuracy.

Insert blue U-Link to its original position. Enable AFC. Remove extender cable from AFC and insert AFC Module.

(b) Extend SYNTH Module Ensure the assigned frequency crystal is installed in the Reference Oscillator Board. Adjust the Lamp Drive Board so the lamp just goes off. If Digital Synthesizer Module is used, determine proper frequency for given frequency you are to use on transmitter. Use tables on side covers of module or use the formula in table 3-1, Operating Instructions section of this manual. Insert the SYNTH Module.

5.2.3. Frequency vs. Power Measurement

(a) Tune VCO to lower end of band with AFC unlocked.

(b) Slowly tune VCO to upper limit, checking frequency every 20 MHz. Check dial accuracy. Accuracy limits ±5%. Approach calibration from both a lower and high frequency.

(c) Monitor power out. For minimum power refer to purchase order to get nominal power specified. Minimum power specification is 20% below nominal power specified.

(d) Also monitor response on spectrum for any spurs or break up of carrier. All spurs must be 50 dB down.

5.2.4. Modulation Sensitivity and Deviation Adjustment

(a) Place the Baseband Module on an extender cable.

(b) Set Baseband Attenuator on the Control Monitor to 5 dB position. Connect Baseband Oscillator to Baseband input of rear of Transmitter. Adjust frequency to 720 KHz at 1V p-p (-6.8 dB, 75 ohms terminated). With proper deviation level set, connect level meter or scope to output of Summing Network (or Variable Amplitude Equalizer if remoted). Adjust strap attenuator to obtain 0.11V p-p (-26 dB on Amplifier Board) and adjust R3 on that board for 0.5V p-p (-12.8 dB on 400 EL, 75 ohms terminated).

(c) Insert Baseband Module and extend the RF Module. Adjust R5 on the

Deviation Control Board for an RF second carrier null as viewed on a spectrum analyzer tuned to the transmitter output frequency. The carrier must be nulled down by 30 dB minimum.

(d) Check the variation in modulation sensitivity across the tuning band. Maximum variation is 3 dB.

5.2.5. Carrier Fail Alarm Adjustment

Extend Control Monitor in Transmitter. Connect a 500 ohm potentiometer on the back side of R19 (100 ohm resistor) to ground. This resistor is right behind R20 which is your XMTR PWR adjust. Switch Control Monitor to XMTR PWR. Adjust the 500 ohm potentiometer until half scale reading on PWR MTR at this point. The Carrier Fault light on the RF Module should just come on. If not, adjust R6 of Lamp Driver Board in RF Module so lamp just lights. Your meter on the Control Monitor should read in the vicinity of 35-45. Remove extender and place Control Monitor back into the Transmitter.

5.2.6. Output Frequency Adjustment

(a) Extend AFC Unit Connect a frequency counter to E4 and E5 of Transmitter Frequency Discriminator to read 70 MHz and to RF output terminal of the RF Head.

CAUTION: OBSERVE RF POWER LEVEL AND ADD APPROPRIATE ATTENUATOR TO PREVENT COUNTER DAMAGE

(b) Disable AFC and adjust VCO frequency to count 70 MHz ±15 kHz. Enable AFC and adjust R6 on the AFC board to count 70 MHz ±15 kHz.

5.2.7. Off-Air Monitor Adjustment

Connect a 1V p-p at 720 kHz to the baseband input. Put the U-Link on the baseband pre-amp in the correct position for the RF Module used. The last number in the RF Module number dictates what position to put the U-Link in (i.e., TCM-603 put the U-Link in the "3" position).

Adjust R1 on the baseband amplifier of the "off-the-Air Monitor output. Insert AFC Module.

5.2.8. Control Monitor Alignment

Adjust pots as follows:

POT NUMBER	METER FUNCTION	CURRENT VALUE
R1	+15V	50 uA
R20	XMTR PWR	90 uA Max.
R17	SYNTH	50 uA
R16	CARR DEV[1]	50 uA
R13	AFC ERR[2]	50 uA

NOTES: 1. Adjust with 720 kHz @ 1V p-p input to the baseband. Then remove 1V p-p input to baseband, turn on DEV TEST on Control Monitor and adjust R13 on Test Tone Oscillator Board (12011534) for the same reading obtained with the 1V p-p input. Now your test tone is calibrated to the input reference level.

2. Adjust with AFC enabled.

5.3. AUDIO PROGRAM CHANNEL TEST

The Audio Program Channel Test should be performed whenever it is suspected the subcarrier demodulator may be going out of phase lock loop. This condition is usually evidenced by distortion or crackling noises on the audio channel. If uncertain about distortion levels, perform Distortion Test first (Para 5.3.3.). If distortion exceeds allowable levels, proceed with the remainder of the Audio Channel Test. The following test equipment (or equivalent) is required:

Spectrum Analyzer	(HP8555A)
Test Oscillator	(HP654A)
Distortion Analyzer	(HP331A)

5.3.1. Sideband Level

1. The deviation of the microwave carrier due to the presence of the subcarrier is 400 kHz peak-to-peak.

2. Refer to Figure 5-1 for sideband level as a function of frequency. (Tol. ±1 dB).

3. Using the proper amount of attenuation, connect the transmitter RF output to the spectrum analyzer and observe the subcarrier level in respect to the main carrier. Adjustments for sideband level are in the Summing Network located in the BSBD module. In the Summing Network, R12 is level adjustment for subcarrier #1 and R9 is level adjustment for subcarrier #2.

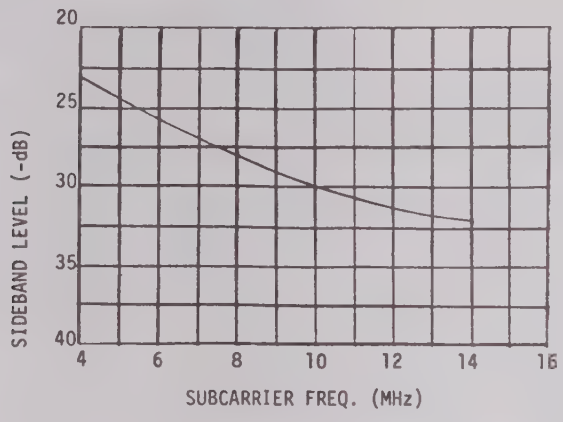


FIGURE 5-1

5.3.2. Preliminary Input/Output Test

1. Check that the audio channel attenuators are set to "0" dB on both the XMTR and RCVR.

2. Check the audio channel metering by using SELECT SWITCH on the Control Monitor.
   (a) If you are using both CH 1 and CH 2 subcarriers, ensure that you have a CH 1 CARR and CH 2 CARR for either appropriate channel.

3. Apply 400 Hz @ 0 dBm (2.2V p-p) signal at 600 ohm balanced using the HP654A Test Oscillator.

5.3.3. Distortion Test

1. Using the Distortion Analyzer (HP331A), set function switch to VOLTMETER and ensure that you have a +14 dBm reading coming out of the appropriate channel of the receiver. (This will thus indicate the proper balanced output of +10 dBm).

2. Place function switch to distortion and check reading. The distortion should be less than 1.0%.

5.3.4. Signal-to-Noise

1. Using a 400 Hz tone @ 0 dBm/600 ohms balanced reference signal, measure the signal-to-noise ratio.

2. Use the same HP meter as in Step 1.1.
   METHOD OF TEST
   (A) Apply the 400 Hz tone and measure the reference level.
   (B) Remove the 400 Hz tone and decrease the dB range on the DISTORTION ANALYZER until an on scale reading is attained. The S/N is the value of the difference in gain expressed in dB's. The S/N ratio should be 58 dB minimum.

5.3.5. Frequency Response (75 sec Emphasis with Elliptical Filter) - EIA

1. Reduce the 400 Hz input signal level to -20 dB/600 ohms and establish a 0 dB reference level on the RMS voltmeter.

2. Vary the input signal frequency from 10 Hz to 20 kHz. Using 400 Hz as a reference, verify the following:

Freq. (Hz)	Spec. (dB)
10 to 10K	0±.5
15K	-2.5
15,750	-15 min
20K	-15 min

5.3.6. Frequency Response (No Emphasis but with Elliptical Filter) - CCIR

1. Use same procedure and specs as in Step 5.3.4.

5.3.7. Frequency Response (No Emphasis, No Filter) - Data

1. Apply a 400 Hz signal level at 0 dB/600 ohms and establish a 0 dB reference level on the RMS voltmeter.

2. Vary the frequency from 10 Hz to 250 kHz. Using 1 kHz as a 0 dB reference point, verify the following:

Freq. (Hz)	Spec. (dB)
10 to 100K	0±.5
150K	-3 min
200K	-3 min
250K	-3 min

5.4. TROUBLESHOOTING TECHNIQUES

The most important part of troubleshooting is to determine the nature of the failure and subsequently locate the malfunctioning module or circuit. Much of the time and labor used in locating failures has been eliminated by use of fail alarm lights and a built-in-test-facility (BITE).

The fail alarm lights are controlled by detected voltages within the various modules and are normally off when the circuits are functioning correctly. The BITE is located in the control monitor module. All power supply voltages and detected voltages from most of the critical circuits are displayed on a front panel meter. By combined use of the fail alarm lights and BITE section most malfunctions can be determined.

An example of fault indentification and a fault analysis chart are given below and on the following page.

Problem

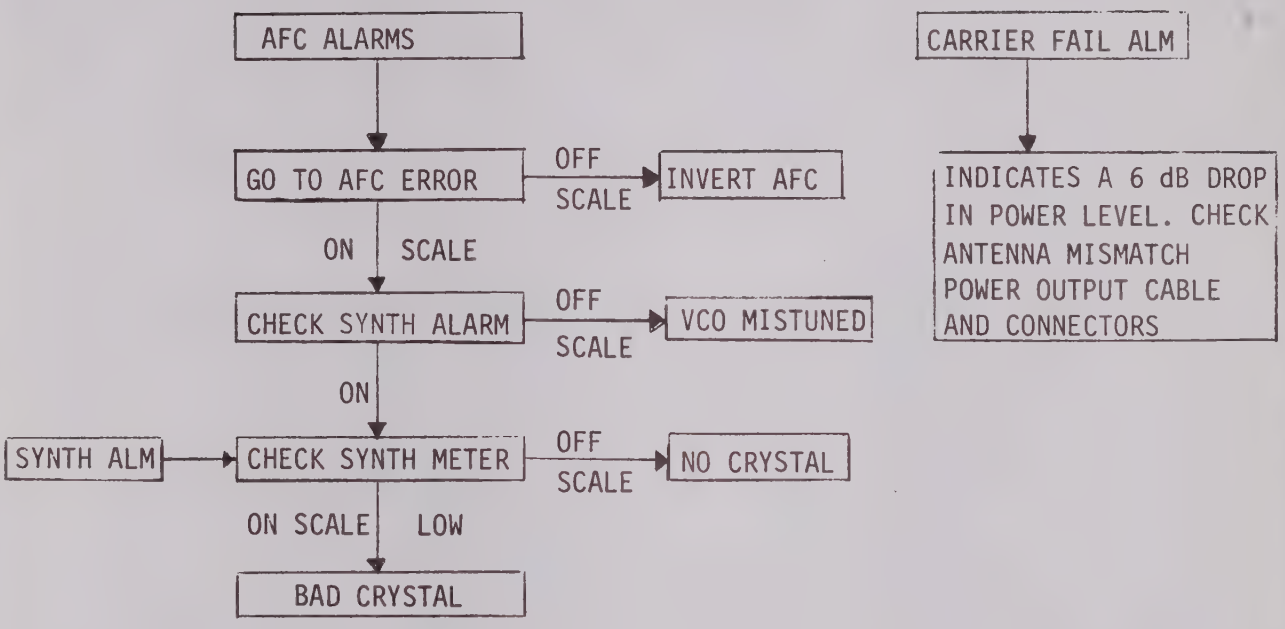
The AFC fault light (AFC Module) and the master alarm light (ALM-Control Monitor Module) are illuminated. Rotation of the monitor selector switch indicates all circuit functions are within their normal operating zones.

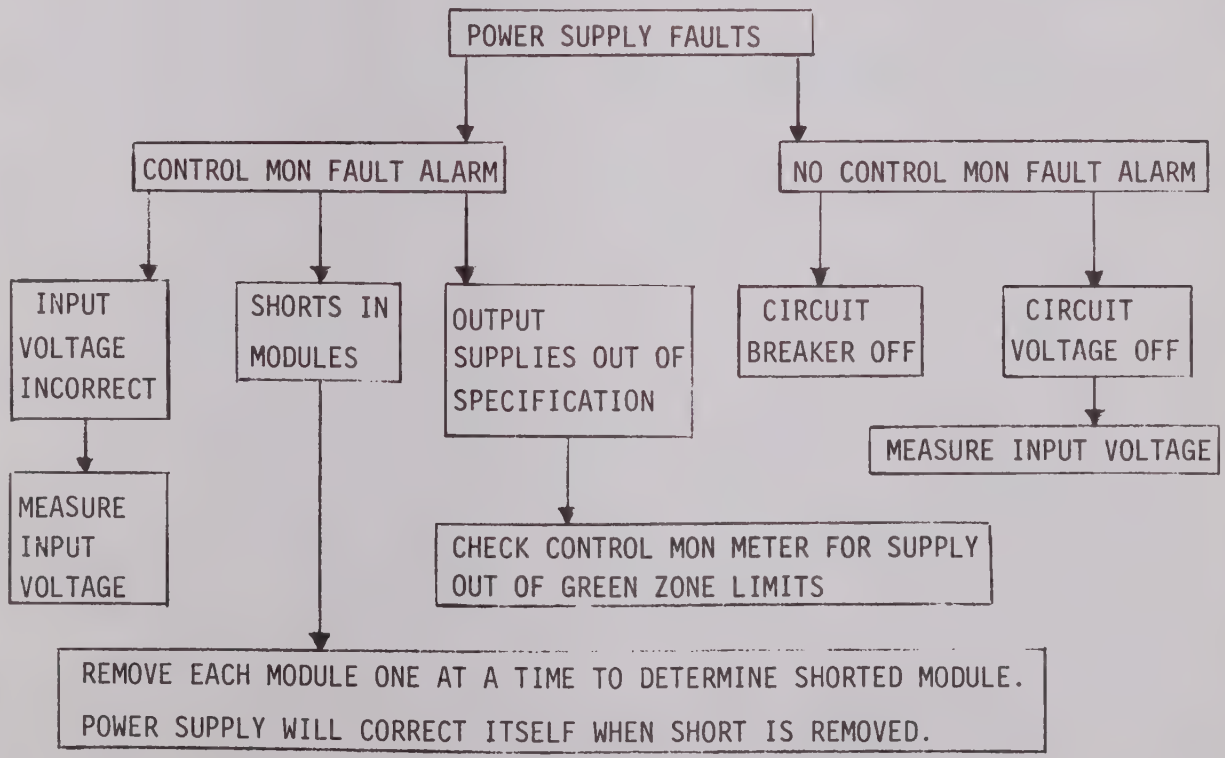
Solution

The AFC enable/disable switch is in the disable position.

FAULT ANALYSIS CHART

(TRANSMITTER)





5.5. TEST REQUIREMENTS SPECIFICATIONS

These Test Requirements Specifications (TRS's) are used at the factory as a final test procedure for the individual modules. Each TRS contains a list of test equipment required, and details the mechanical and electrical test necessary to align each module and check for proper operation.

The following TRS's are included in this section:

TRS Number	Description
17020028	Remote Enclosure Assembly
17021586	AC Power Supply
17021600	FMR Module
17021643	Control Monitor Module
17021644	Baseband Module
17021645	Synthesizer Module
17021646	AFC Module
17021647	Digital Frequency Synthesizer

NOTE: Due to the complexity of the R.F. Module and the equipment required for testing, the TRS for this module is not included in this manual. A defective R.F. Module should be returned to the factory for repair.

TERRACOM Div. of Conic Corp.	TEST REQUIREMENTS SPECIFICATION FOR	NO 17020028	REV
		PAGE 1 OF 4	
APPROVED	REMOTE ENCLOSURE (RCVR or XMTR)	PREPARED BY D. Shuman	
		CHECKED BY	
		DATE 10/26/73	

1.0 Test Equipment Required

1.1 Multimeter, Simpson 260, or equivalent.

1.2 Power Supply, -15V @1 mA, HP 6205B, or equivalent.

1.3 Assorted Clip Leads

2.0 Mechanical Test

2.1 The unit must be given a visual quality and correct assembly check in accordance with unit wiring diagram 12010028.

2.2 Caution must be taken to insure that no damage occurs to the sensitive front panel meter movement. Always leave meter selector switch in "Transit" position when not checking other positions. Check to see that two diodes (CR-1 and CR-2) are mounted properly on meter board with the cathode bands in opposite directions.

2.3 Rotate front panel switch through all positions to insure smooth switch action.

2.4 Check connector on bottom of case for correct installation. Insure that there are no bent pins.

3.0 Electrical Test

3.1 Continuity Test

3.1.1 Connect one lead of a Simpson 260, set to the R x 1 scale, to the pins indicated on J1 (bottom of enclosure) and the other lead to the pins indicated on J2 (inside rear of enclosure).

J1 Pins	J2 Pins	Resistance
A	A1	0 ohm
A shield	A1 shield	-0- ∞ between A and shield
B	A3	-0-
B shield	A3 shield	-0- ∞ between B and shield
C	10	-0-
D	8	-0-
E	9	-0-
F	6	-0-
G	11	-0-
H	22	-0-
J	2	-0-
K	3	-0-
M	19	-0-
N	1	-0-
Q coax center conductor (Black)		-0-
Q shield coax shield (Black)		-0-

3.1.2 To check the synthesizer oscillator harness, connect one meter lead to the indicated J2 pins and the other lead to the indicated synthesizer wires.

J2 Pins	Synthesizer Wires	Resistance
A2	Coax Center Conductor (Red)	-0-
A2 shield	Coax shield (Red)	-0- infinite between center and shield
#10	Black Wire	-0-
#8	Green Wire	-0-

3.2 Headset Circuit Test

3.2.1 Apply -15 volts on J1 between Pins D and R shield (-15V to Pin D). Set Simpson 260 to the 10 mA range. At J4 (headset socket) connect the positive meter lead to the ground ring and the negative meter lead to the tip. The meter should indicate a 1 mA current. Leaving the positive probe where it is and connecting the negative probe to J1. Pin L should indicate a brief charging current, and then no current if the coupling capacitor C1 was in an uncharged condition before the test. With -15 volts still applied connect the meter, on the 10 mA range, between J1, Pin P(negative) and R shield (positive). The meter should indicate a 1 mA current. Leaving the positive probe where it is and connecting the negative probe to J4 center ring should indicate a brief charging current and then no current, if the coupling capacitor C2 was in an uncharged condition before the test.

3.2.2 Check each pin in J to every other pin to ensure that no shorts exist between wires, except between Pin C and R shield.

3.3 Meter Test

3.3.1 Using a Simpson 260 set on the R x 10,000 scale connected to the indicated Pins of J1, observe the readings indicated on the ohm meter and panel meter for each position of the meter function switch.

NOTE: Do not use a lower scale than R x 10,000 for any switch position except transit, or damage to the panel meter may result.

Switch Position	Positive Lead to J1 Pin #	Negative Lead to J1 Pin #	Resistance	Panel Meter Indication
+15V	F	C	220K	Upscale reading on meter which may be varied by R14
-15V	C	D	200K	Same as above
-28V	C	E	450K	Same as above
AFC ERROR	C	M	70K-120K	Upscale Reading varied by R-6
SIG.STR.(Rx)	J	R	4K-6K	Upscale Reading varied by R-8
THRESH. (Rx)	R	K	14-K-23K	Upscale Reading varied by R-10
SYNTH (Tx)	R	J	2K-11K	Upscale Reading varied by R12
TRANSIT	E-24 and E-25 on Meter Board		-0-	Meter is shorted in Transit Position

1.0 TEST EQUIPMENT REQUIRED

1.1 Voltmeter, Digital, Data Technology DT-360 or equivalent.

1.2 Resistor, 1 ohm, 1%, 10 Watts.

1.3 Oscilloscope, HP Model 180A with Type 1801A Vertical Amplifier and Type 1820A Time Base.

1.4 Variac, AC, 90-140 VAC, 1½ Amp.

1.5 Load Resistors, 100% Load:

25 ohms at 9 watts	(+15V)
8.4 ohms at 5 watts	(+5V)
12.5 ohms at 20 watts	(-15V)
23.4 ohms at 33 watts	(-28V)
280 ohms at 5 watts	(-28V unreg)

1.6 Load Resistors, 150% Load:

15 ohms at 15 watts	(+15V)
5 ohms at 5 watts	(+5V)
8.4 ohms at 30 watts	(-15V)
15.5 ohms at 50 watts	(-28V)

1.7 TerraCom Power Supply Test Fixture.

1.8 TerraCom Power Supply Test Rack.

2.0 MECHANICAL TEST

2.1 The unit must be given a visual quality and correct assembly check.

3.0 ELECTRICAL TESTS

3.1 Connect to TerraCom Power Supply Test Fixture No. _____. Apply primary power with the switch in the OFF position, a red PWR SPLY FAULT light should be lit. When the switch is moved to the ON position, an amber PWR SPLY ON light should be lit, and the red PWR SPLY FAULT light should extinguish.

3.2 Initial Burn-In

3.2.1 Operate a new power supply at 75% load in the TerraCom Power Supply Test Rack for a period of at least 7 days prior to further tests and adjustments.

3.3 Undervoltage

3.3.1 Turn V ADJ pot down until red PWR SPLY FAULT light comes on. Note that the voltage is 20 - 30% below nominal and record undervoltage point. Repeat for each regulator.

3.4 Overvoltage

3.4.1 Turn V ADJ pot up until overvoltage crowbar shuts down the regulator and red PWR SPLY FAULT light begins to blink. Note that this voltage is 5 - 10% above nominal and record overvoltage point. Repeat for each regulator.

3.5 Voltage Set

3.5.1 With all outputs loaded 100%, set V ADJ pot on each regulator to proper output voltage and record setting.

3.6 Current Limit Set

3.6.1 With all outputs loaded 100%, set I ADJ pot as follows: change load on one regulator at a time to 150%; turn I ADJ pot up until voltage doesn't change; then turn the pot down until the point at which the voltage just begins to drop is attained; set the pot just above this point. Repeat for each regulator.

3.7 Load Regulation

3.7.1 With all outputs loaded 100%, switch from no load to 100% load on each output separately. Record the change in output voltage and note that it is within tolerance as shown in Table 1.

3.8 Line Regulation

3.8.1 With all outputs loaded 100%, vary the input voltage from 100 - 135 volts AC. Record the change in output voltage and note that it is within tolerance as shown in Table 1.

3.9 Ripple and Noise

3.9.1 Observe the ripple on an oscilloscope with each output at minimum load and 100% load. Record the ripple and note that it does not exceed the value in Table 1.

3.10 Short-Circuit Protection

3.10.1 Short each output individually and note that the PWR SPLY FAULT light is lit and that the input current does not rise significantly. Remove the short and note that the fault light extinguishes and the output voltage returns to normal.

3.11 AC Current Requirement

3.11.1 With all outputs loaded 100%, measure and record the input current. Note that it does not exceed value listed in Table 1.

3.12 -28V Unregulated Output

3.12.1 With 115 VAC input, measure the -28V unregulated output voltage, load regulation, and ripple. Note that values in Table 1 are not exceeded.

3.13 220 VAC Operation

3.13.1 With no load on any output and input voltage set to 115 VAC, switch the voltage conversion switch to the 220V position. Note that the pilot light dims and all outputs drop in voltage, but no harmful response is observed.

TABLE I

POWER SUPPLY DATA SHEET
TCM-6 SERIES
AC - DC POWER SUPPLY

S/N_____ Date:_____

Tech:_____

SUPPLY	LOAD (MA)	UNDER VOLTAGE (VOLT)	OVER VOLTAGE (VOLT)	VOLTAGE ACCURACY (VOLT)	RIPPLE & NOISE (MV p-p)	LOAD REG. (±MV)	LINE REG. (±MV)	SHORT CKT ( )
+15V	600 (25 ohm at 9W)	_____ (10.5-12)	_____ (15.8-16.5)	_____ (±0.05)	_____ (1.0)	_____ (150)	_____ (20)	_____
+5V	600 (8.4 ohm at 5W)	_____ (4.0-4.5)	_____ (5.8-6.5)	_____ (±0.05)	_____ (1.0)	_____ (50)	_____ (10)	_____
-15V	1200 (12.5 ohm at 20W)	_____ (10.5-12)	_____ (15.8-16.5)	_____ (±0.05)	_____ (1.0)	_____ (200)	_____ (20)	_____
-28V	1200 (23.4 ohm at 33.5W)	_____ (20.5-22)	_____ (29.5-32)	_____ (±0.1)	_____ (1.0)	_____ (280)	_____ (30)	_____
-28V Unreg.	100 (280 ohm at 5W)	None	None	_____ (±5.0V)	_____ (25)	_____ (±1.5 volts)	None	None

AC LINE CURRENT

115V_____1.1A Max

POWER SUPPLY SWITCHED ON WITH FULL LOAD ALREADY APPLIED ON ALL VOLTAGES

_____
( )

A1	
A2	
1	AC in (HIGH)
2	AC in (LOW)
3	
4	
5	Unreg -28V DC
6	+15V DC
7	+5V DC
8	-15V DC
9	-28V DC
10	GND
11	
12	CASE GND
13	
14	
15	
16	+15V DC
17	+5V DC
18	-15V DC
19	-28V DC
20	GND
21	GND
22	Fail Alarm Buss
A3	

TABLE II
POWER SUPPLY CONN.

TERRACOM Div. of Conic Corp.	TEST REQUIREMENTS SPECIFICATION FOR	NO 17021600	REV
		PAGE 1 OF 7	
APPROVED	FMR MODULE 12011600	PREPARED BY D. Shuman	
		CHECKED BY	
		DATE 1/27/75	

1.0 TEST EQUIPMENT REQUIRED

1.1 Power Supply ±15V @500 mA HP6205B, or equivalent.

1.2 VOM, 20K ohm/volt.

1.3 RF Voltmeter, Boonton 91-C, or equivalent.

1.4 Oscilloscope, Tektronix 465, or equivalent.

1.5 Microwave Link Analyzer

1.5.1 Transmission Generator, HP 3710 with 3716A plug-in, or equivalent.

1.5.2 Demodulator Display, HP 3702B, or equivalent.

1.5.3 Group Delay Detector HP 3705, or equivalent.

1.6 TerraCom Test Modulator, or equivalent.

1.7 Wandel & Golterman PSM-5 Level Measuring Set, or equivalent.

2.0 MECHANICAL TESTS

This module and the PC boards therein must be given a visual quality inspection to include soldering, wiring, cleaning, and proper assembly.

3.0 ELECTRICAL TESTS

3.1 Connect equipment as per figure 1 and check the current drawn from the +15 and -15 power supplies. The current should be:

+15V @ 70 mA ±20%

-15V @ 430 mA ±20%

3.2 On Invert-Non/Invert Amplifier remove the strap from E19 to E18 (high input impedance). Install U-Links from E9 to E10 and from E6 to E7.

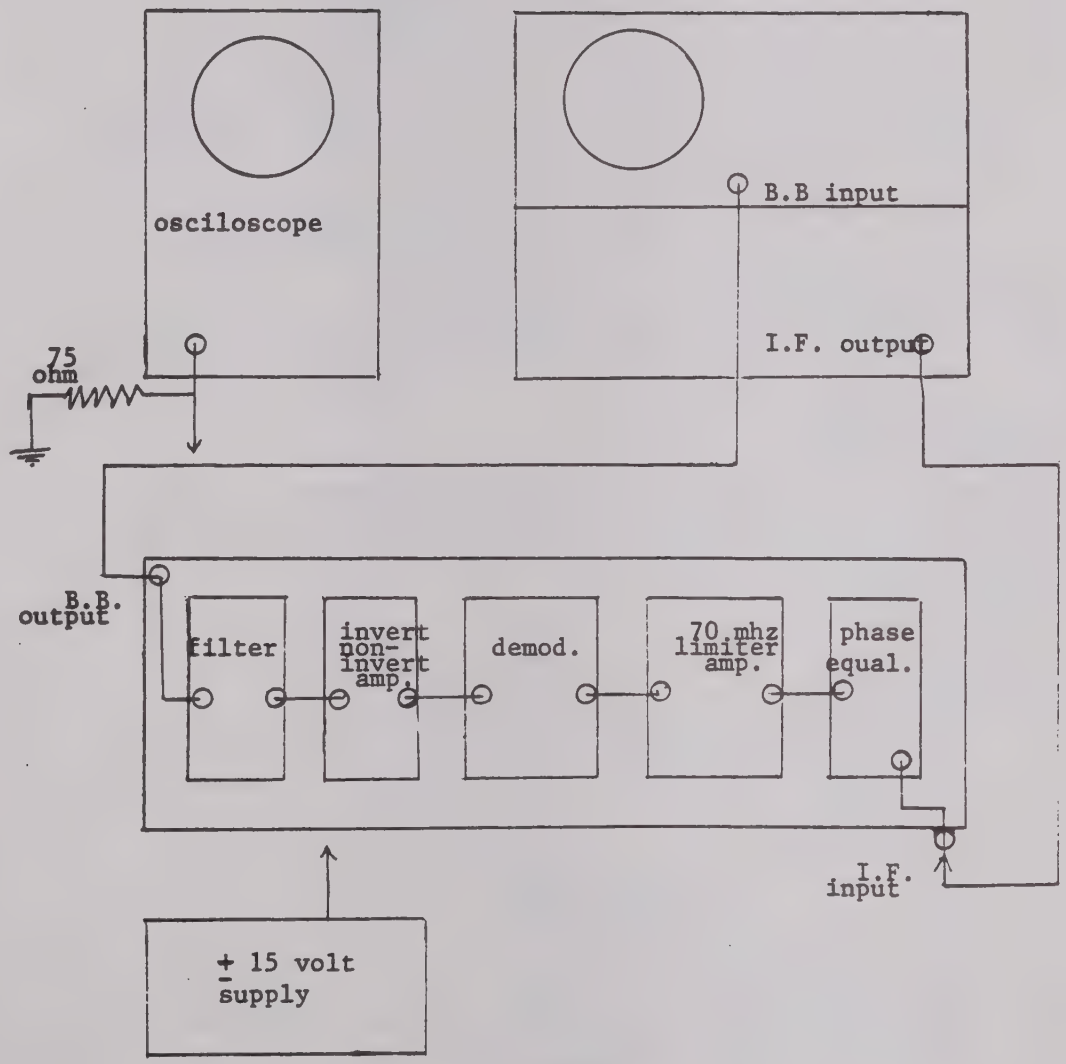

osciloscope
B.B input
I.F. output
75 ohm
B.B. output
filter
invert non-invert amp.
demod.
70 mhz limiter amp.
phase equal.
I.F. input
+ 15 volt
- supply

FIGURE 1

3.3 Remove the red and black U-links connecting the phase equalizer output to the limiter input. Connect the coax input cable directly to the limiter input. If a cable equalizer is used at the module output, bypass it by connecting the output cable directly to the low pass filter.

3.4 Measure the RF voltage on the case of the first transistor of demodulator and use R27 on the limiter amplifier to set this voltage to 400 mV rms. At this setting the module front panel meter (switched to demod. drive) should read full scale to the right.

3.5 Demodulator Alignment

3.5.1 Adjust the output pot (R56) of the demodulator to 75% full clockwise.

3.5.2 Adjust L3 all the way in and use C9 as the tilt control.

3.5.3 Adjust R16 to keep the module front panel meter (switched to read frequency) in its center position.

3.5.4 The outer two coils (L10, L11) control the peak in the response (see figure 2). Start with these coils all the way to the top and adjust them in to get the peaks at 60 MHz and 80 MHz. The corresponding capacitors (C30, C31, respectively), may require adjustment also.

3.5.5 Adjust L3 out to bring up the center. Recheck Disc. Err Output and readjust to 0 volts if necessary.

3.5.6 Continue to work the L3-C9 combination. L10-C30 combination, and L11-C31 combination, to achieve maximum flatness and widest response. Also adjust R16 to keep the Disc. Error Output at 0 volts.
NOTE: If the linearity is adjusted too wide, the output amplitude is too low, do not adjust wider than required.

TERRA COM Div. of Coote Corp.	TEST REQUIREMENTS SPECIFICATION FOR	NO 17021600	REV
APPROVED		PAGE 4 OF 7	
	FMR MODULE 12011600	PREPARED BY D. Shuman	
		CHECKED BY	
		DATE 1/27/75	

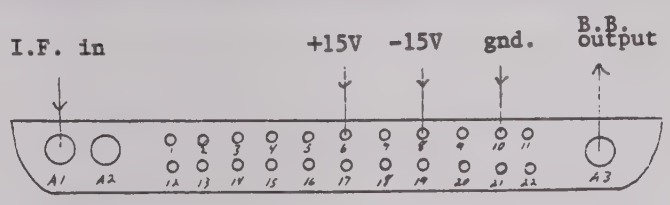
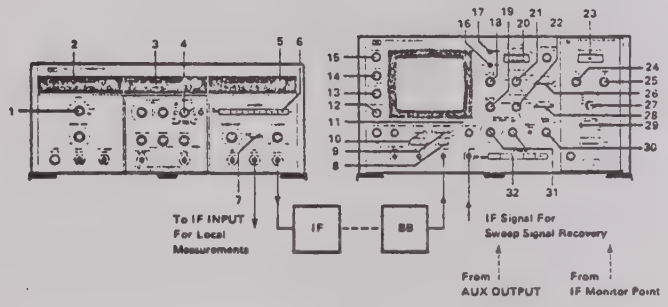


FIGURE 2

IF-BB MEASUREMENTS



All controls not labelled may be neglected.

1. Set the CRT controls as follows:

Y2 DISPLAY (22) .. .. IF
Y1, Y2 GAIN (18), (19) .. .. .. ccw
Y1, Y2 POSITION (18), (19) .. mid pos

Adjust the INTENSITY control (15) until two spots just appear. Adjust the FOCUS (14) and ASTIGMATISM (rear panel) controls for two round sharp spots.

Set the Y2 DISPLAY switch (22) to SPECTRUM and adjust the X GAIN (13) and X POSITION (11) controls for a 10cm display. Adjust the TRACE ALIGN (rear panel) control to align the traces parallel to the horizontal graticule lines.

2. Set the MLA controls as follows:

SWEEP (1) .. .. normally INT
SWEEP WIDTH (2) .. .. as required
DEVIATION (3) .. .. as required
BB FREQUENCY (4) .. .. as required
IF FREQUENCY (5) 70MHz
AUX OUTPUT (7) .. ..IF (UNCAL)
BB INPUT (8) .. .. EXT
SWEEP SOURCE (9) .. .. INT IF
BLANKING (10) .. .. OFF
Y1 DISPLAY (21) .. .. IF
Y2 DISPLAY (22) .. .. DELAY
Y1 Y2 CALIBRATION (26) .. .. OFF
BB FREQUENCY (27) .. .. same as (4)
MARKERS (28) .. .. SLIDING
MARKER OFFSET (30) .. .. as required

3. Adjust the Transmitter IF ATTENUATOR (6) for the required drive level into the IF input of the test item.

4. Connect the 75 ohm cabling as shown in the diagram.

FOR LOCAL MEASUREMENTS

5. Connect the AUX OUTPUT to the IF INPUT via a 75 ohm cable.

6. Adjust the Receiver IF ATTENUATOR (32) to give an on-scale reading on the IF LEVEL meter (20). Ensure that the AFC LOCK lamp (16) is lit, and the IF UNCAL lamp (17) is extinguished.

7. Adjust the X PHASE SHIFT control (12) to superimpose the markers on the forward and return traces, and reset the BLANKING switch (10) to ON.

8. Set the Y1 DISPLAY switch (21) to BB and adjust the Receiver BB POWER attenuator (31) for an on-scale reading on the BB LEVEL meter (20).

FOR REMOTE MEASUREMENTS

5. Connect an IF monitor point, if available, to the IF INPUT. If there is no IF monitor point available to establish the frequency markers, the measurement trace should be phased up as follows.

6. Set the SWEEP SOURCE switch (9) to EXT BB+, and set the Y1 DISPLAY switch (21) to BB. Adjust the Receiver BB POWER attenuator (31) for an on-scale reading on the BB LEVEL meter (20).

7. Adjust the X PHASE SHIFT control (12) for minimum opening between the forward and return traces of the trace of interest, and reset the BLANKING switch (10) to ON.

This procedure may be followed if the IF monitor point is at a level greater than -10dBm. If not, then open the signal path to use the IF signal to establish the markers and reconnect the signal path.

FIGURE 3

BB LINEARITY AND GROUP DELAY DISTORTION

A simultaneous display of BB linearity and group delay distortion is available. The BB FREQUENCY switches (4) and (27) must be set to the same frequency, which should be 500kHz, (555△kHz) or less.

To calibrate the Y1 trace, select a suitable calibration factor on the Y1 Y2 CALIBRATION switch (26) and adjust the Y1 GAIN control (18) to the required sensitivity. Reset the Y1 Y2 CALIBRATION switch (26) to OFF.

To calibrate the Y2 trace, adjust the SET LEVEL control (24) fully clockwise and adjust the PHASE LOCK control (25) for an up-scale deflection on the PHASE LOCK/LEVEL meter (23). Readjust the SET LEVEL control (24) for a reading within the green band of the PHASE LOCK/LEVEL meter (23). Adjust the PHASE LOCK control (25) for a peak on the PHASE LOCK/LEVEL meter (23). If necessary, readjust the SET LEVEL control (24) for a reading within the green band of the PHASE LOCK/LEVEL meter (23). Set the DIFF PHASE CALIBRATION switch (29) to a suitable calibration factor, and adjust the Y2 GAIN control (19) for the required sensitivity. Reset the DIFF PHASE CALIBRATION switch (29) to OFF.

DIFFERENTIAL GAIN AND DIFFERENTIAL PHASE

A simultaneous display of differential gain and differential phase can be obtained with the Y1 DISPLAY switch (21) set to BB and the Y2 DISPLAY switch (22) set to DELAY. The BB FREQUENCY switches (4) and (27) must be set to the same frequency which should be greater than 500kHz (555 △kHz).

To calibrate the Y1 trace, select a suitable calibration factor on the Y1 Y2 CALIBRATION switch (26) and adjust the Y1 GAIN control (18) for the required sensitivity. Reset the Y1 Y2 CALIBRATION switch (26) to OFF.

To calibrate the Y2 trace, adjust the SET LEVEL control (24) fully clockwise and adjust the PHASE LOCK control (25) for an up-scale deflection on the PHASE LOCK/LEVEL meter (23). Readjust the SET LEVEL control (24) for a reading within the green band of the PHASE LOCK/LEVEL meter (23). Adjust the PHASE LOCK control (25) for a peak on the PHASE LOCK/LEVEL meter (23). If necessary, readjust the SET LEVEL control (24) for a reading within the green band of the PHASE LOCK/LEVEL meter (23). Set the DIFF PHASE CALIBRATION switch (29) to a suitable calibration factor and adjust the Y2 GAIN control (19) for the required sensitivity. Reset the DIFF PHASE CALIBRATION switch (29) to OFF.

FIGURE 4

3.6 Adjust R56 on the demodulator for 500 mV p-p output (using scope with 75 ohm load on input) when IF is deviated 8 MHz p-p.

3.7 Reconnect phase equalizer to the IF limiter input, and place the pad U-Link in the E17 to E18 position (pad in). Increase the IF input level to +6 dBm.

3.8 Adjust L3, C6, and R10 on the phase equalizer for the best group delay and amplitude linearity. To get the best results it will be necessary to go back and touch up the demodulator adjustments, (as in Step 3.5). Work back and forth between the phase equalizer and the demodulator until no further improvements can be made. Minimum requirements are less than 0.5 nsec. group delay $\pm$4 MHz and less than 1% amplitude non-linearity $\pm$10 MHz.

3.9 Readjust link analyzer for 3.58 MHz baseband to measure differential gain and differential phase. Readjust phase equalizer to get differential gain to less than 1% $\pm$4 MHz and differential phase to 0.5° $\pm$4 MHz.

3.10 Recheck linearity and group delay distortion at 555 kHz. If it is necessary continue adjustments in Steps 3.7 and 3.8 until all conditions are met.

3.11 Check that the adjustments made in steps 3.7 through 3.9 hold for both the invert and non/invert outputs of the invert-non/invert amplifier.

3.12 Frequency Response Test

3.12.1 Connect the output of the level measuring set (set to -30 dBV) to the test modulator input. Connect the test modulator output (set to +6 dBm) to the module input. Connect the module output to the level measuring set input. Adjust modulator frequency to center module frequency meter.

3.12.2 The module frequency response must be flat to ±.1 dB to 7.5 MHz and to ±.3 dB to 10 MHz, if a 15 MHz low pass butterworth filter is used on the output. If no filter is used the response must be flat ±.1 dB to 10 MHz. If necessary, C3 (invert side) and C6 (non-invert side) may be adjusted a small amount to correct the frequency response in both positions of the invert-non/invert amplifier U-links.

3.13 Final Adjustments

3.13.1 Re-connect module to link analyzer. Baseband linearity is affected by the installation of the module side cover, therefore C3 must be adjusted and the cover installed in a trial and error sequence until the linearity is correct with the cover on.

3.13.2 Check that there is less than a 2% change in linearity with input levels of +11 dBm to -5 dBm.

3.13.3 Re-check module output level with an oscilloscope to ensure that the output level is 500 mVp-p for 8 MHz p-p input deviation. If the optional cable equalizer is to be used, reconnect it and verify that the output level drops no more than 6 dB (250 mV).

3.13.4 Wax all adjustable coils and potentiometers, and apply torque lacquer to all adjustable capacitors to indicate that all adjustments are completed. Attach the module side covers, and module is ready for service.

TERRA COM Div of Conic Corp.	TEST REQUIREMENTS SPECIFICATION FOR	NO 17021643	REV.
APPROVED	CONTROL/MONITOR (XMTR)	PAGE 1 OF 5	
		PREPARED BY	
		CHECKED BY	
		DATE	

1.0 TEST EQUIPMENT REQUIRED

1.1 Power Supply, Dual, 50V at 0.6A, HP 6205B or equivalent.

1.2 Oscillator, Wide Range, 5 Hz to 60 kHz, HP 200CD or equivalent.

1.3 RF Voltmeter, Boonton 91C or equivalent.

1.4 Analyzer, Distortion (used as Voltmeter), HP 331A or equivalent.

1.5 Generator, VHF Signal, HP 608C or equivalent.

1.6 Multi-Meter, Simpson, Type 260, or equivalent.

1.7 Adaptor, Double-Banana Plug to BNC, 4 each.

1.8 Test Cable, RG-59 with BNC Connectors, 2 each.

1.9 Patch Cords, Single Stack Banana, 4 each.

1.10 Resistor, Load 75 ohms.

1.11 Resistor, Load, approximately 600 ohms.

1.12 Plug Phono

2.0 MECHANICAL TEST

2.1 The unit must be given a visual quality and correct assembly check in accordance with Unit Wiring Diagram #12011643.

2.2 Caution must be taken to insure that no damage occurs to the sensitive front panel meter movement. Always leave meter selector switch in "Transit" position when not checking other positions. Check to see that two diodes are mounted properly on Cont/Mon PC Board with the cathodes (bands) in opposite directions.

2.3 Rotate front panel attenuators and switches through all positions to insure smooth switch action.

2.4 Check connector on back of rear housing for correct installation. Insure that there are not bent pins.

2.5 Check that all screws have lock washers where required.

3.0 ELECTRICAL TEST

3.1 Continuity Test

3.1.1 Connect one lead of a Simpson 260 set to proper R-Scale to the pins as indicated and the other lead to the test point terminals as indicated and measure the following resistances.

Pin	Test Point (TP)	Resistance Min.	Max.
17	E6	1K	51K
16	E7	1K	26K
15	E8	1K	51K
14	E9	1K	26K
13	E10	20K	70K
12	E11	2K	27K
11	E12	1K	6K
9	E13	100 ohms	10.1K
8	E14	430K ±5%	
7	E15	220K ±5%	
6	E16	220K ±5%	
* 5	Pin 22	560 ohms (82 ohms)	
10,CC,T,Z, P, and TPA	Gnd	0 ohms	

*If fail relay option is used resistance is 82 ohms.

3.1.2 Position "Deviation Test" switch to "ON" position and check for continuity between pin 10 and pin 22.

3.1.3 Position "RF/Stby" (optional) switch to Stby and check for continuity from pin 21 to pin 10. Position switch to "RF ON" and check for no continuity.

3.2 Meter Test

3.2.1 Using Simpson 260 set to R x 10,000, DC + and zeroed properly, connect Pos (+) lead to the positive terminal of meter and the Neg (-) lead to the negative terminal of the meter. Note deflection to approximately midscale on meter in any position on Control/Mon switch except transit.

3.3 System Monitor Test

3.3.1 This test is to check proper switch position to appropriate function. Using a Simpson 260 set to R x 10,000, DC +, and zeroed properly mote Cont/Mon meter positive deflection.

Mon. Switch Position	Simpson Pos (+) Lead	Simpson Neg (-) Lead
+15V	Pin 6	Gnd
-15V	Gnd	Pin 7
-28V	Gnd	Pin 8
Xmtr Pwr	Pin 20	Pin 9
Synth	Gnd	Pin 11
Carr Dev	Gnd	Pin 12
AFC Err	Pin 20	Pin 8
Ch 1 Dev	Gnd	Pin 14
Ch 1 Carr	Gnd	Pin 15
Ch 2 Dev	Gnd	Pin 16
Ch 2 Carr	Gnd	Pin 17

3.4 Alarm Lamp Test

3.4.1 Apply -28 VDC to pin 5 and Gnd pin 22. Alarm lamp should be lit.

3.5 Audio Attenuator Tests

3.5.1 Load voltmeter (distortion analyzer) input to 600 ohms. Be sure input to voltmeter is not referenced to ground. Connect wide range oscillator to voltmeter input and adjust oscillator for '0' db reading on voltmeter at 1 kHz. Now connect oscillator to pins M and N and connect pins X and Y to ungrounded voltmeter with 600 ohms load. Set Aud Ch 1 Atten to '0'. The reading now indicated on the voltmeter should be 0 db ($^{+0}_{-0.2}$ db). To check for correct 600 ohms balance configuration, alternately jumper pin 10 to pins M, N, X, and Y and check that voltmeter indicates 0 db ($^{+0}_{-0.2}$ db) or no change. Remove jumper. Now turn Aud Ch 1 Atten to each position between 0 and 10 and check that voltmeter reading corresponds to within 0.2 db. Repeat the above procedure for the Aud Chan 2 Atten using pins R and S for input and pins AA and BB for output to voltmeter.

3.6 B-Band Attenuator Tests

3.6.1 Set range switches on both test oscillator and RF voltmeter to 0 dbm and oscillator frequency to 14.0 MHz. Install a 75 ohms load on voltmeter input and connect a cable from oscillator to voltmeter. Adjust oscillator for '0' db reading on voltmeter. Now connect oscillator to pins K and L and connect pins V and W to voltmeter with 75 ohms load. Grounds (or low side) should be pins L and W respectively. Set B-Band Atten to '0'. Reading now indicated on the voltmeter should be 0 db ($^{+0}_{-.2}$ db). To check correct grounding, alternately jumper pin 10 to pins K and V and check that voltmeter indicates no signal. Remove jumper. Now turn B-Band Atten to each position between 0 and 10 and check that voltmeter reading corresponds to within 0.2 db.

3.7 Fail Relay (Option)

3.7.1 Connect Simpson 260 to pin 23 and 24. Set meter to R x 1, DC + and zero properly. Check that R23 is a 82 ohm 1 watt and not 560 ohms. Connect 28 VDC to pin 5. Turn "Dev Tst" on. Simpson should indicate a short when Alm Lamp is lit. Turn "Dev Tst" off. Alm Lamp should not be lit and Simpson should indicate an open.

1.0 TEST EQUIPMENT REQUIRED

1.1 Precision Level Measuring Set, Wandel Goltermann PSM-5 or equivalent.

1.2 Dual Power Supply, ±15V @ ±200 mA.

1.3 Patch Cable (see Appendix).

1.4 Spectrum Analyzer, HP with an 8554L RF Section.

2.0 MECHANICAL TEST

2.1 Inspect module to insure correct voltages are connected to the correct pins and the "U" links are in the proper positions (pre-emphasis and strap attenuator boards).

2.2 Check to be sure the boards are connected in the correct order as per Assembly Drawing 12011644.

3.0 ELECTRICAL TESTS

3.1 Connect module as per Figure 1.

3.2 Turn on power supply and observe the supply currents.

Supply	Current
+15V	150 mA ±10%
-15V	60 mA ±10%

3.3 Measure the level of the subcarriers on the PSM-5. They should be -23.8 dbm. Adjust R9 and R12 of the summing network board if required.

3.4 Set level out of PSM-5 to -2.8 dbm and sweep entire module. Figure 2 is the expected response.

3.5 Measure gain of module at cross-over frequency of pre-emphasis curve (see TRS #17021023 for message and TRS #17021024 for TV). The gain should be -1 db, adjust strap attenuator for correct gain.

3.6 Connect a 2.6 kHz, 5VPP signal to Pin 3 of P1 , using P in 20 as GND.

3.7 Disconnect the module from PSM-5 and connect output (A3) to the Spectrum Analyzer.

3.8 Observe the subcarrier on the Spectrum Analyzer and switch the Test Tone Select and Aud 1. Adjust R14 on the appropriate subcarrier to deviate the signal ±100 kHz peak.

3.9 Switch the Test Tone select and Aud 2 and repeat Step 3.8 for the other subcarrier.

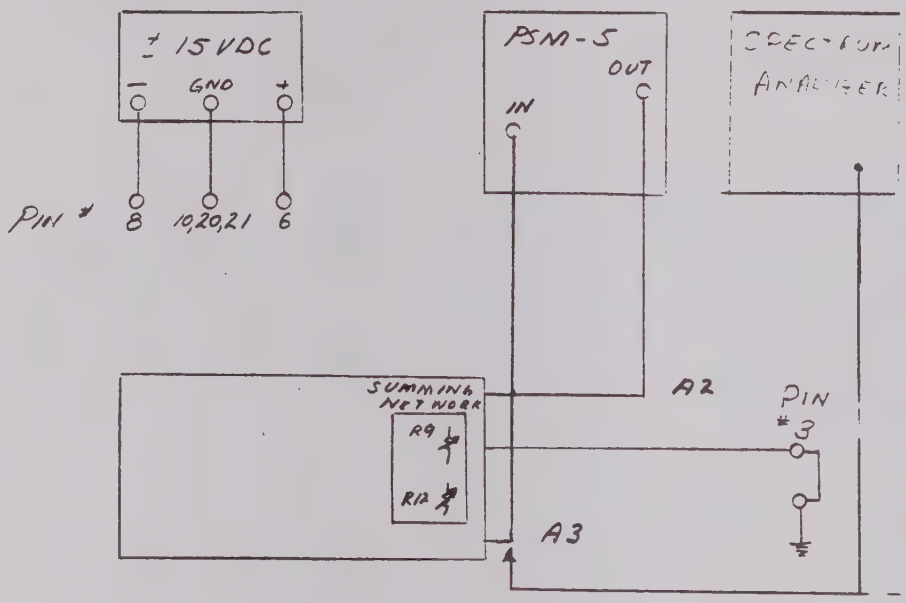


FIGURE 1

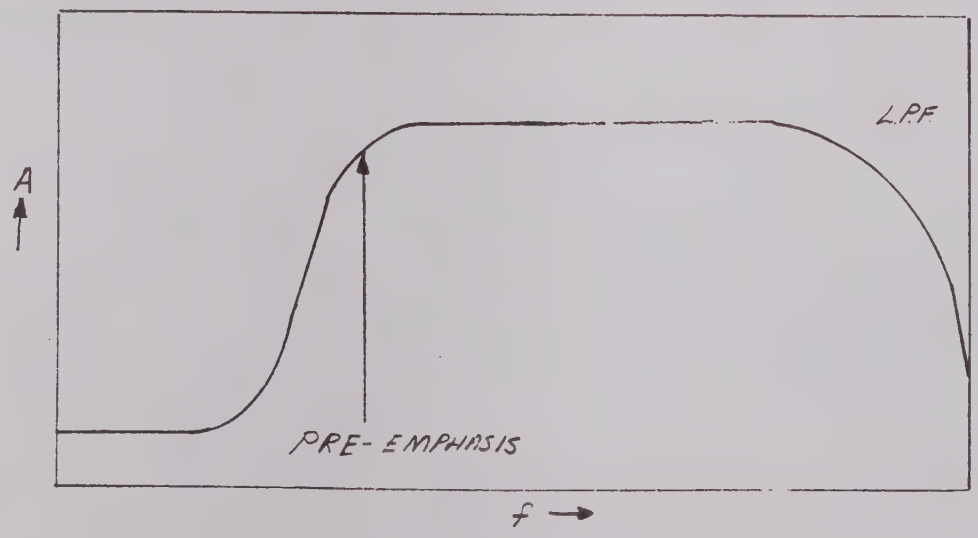
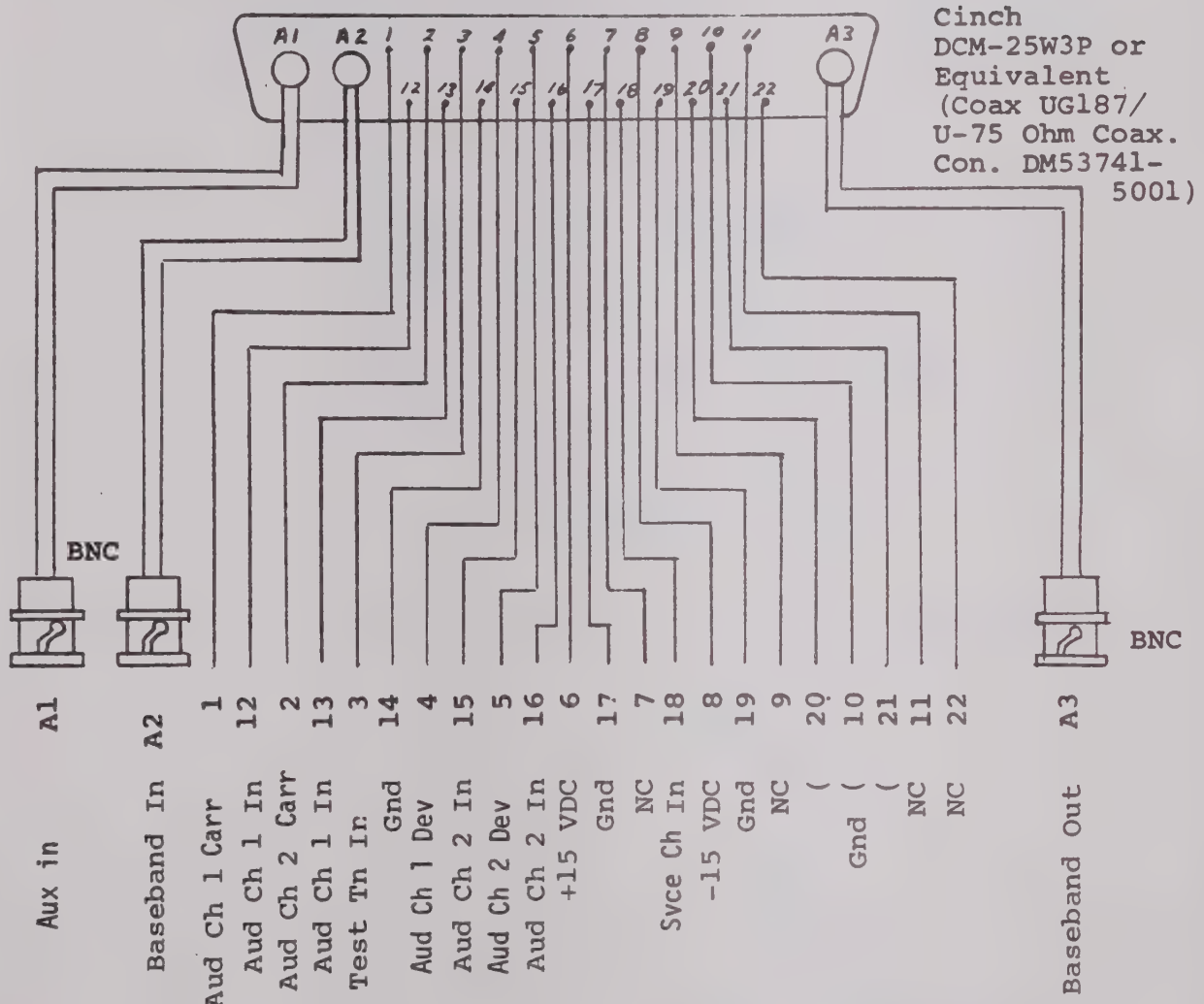


FIGURE 2

4.0 APPENDIX

4.1 Patch Cable



TERRA COM Div of Conic Corp.	TEST REQUIREMENTS SPECIFICATION FOR	NO 17021645	REV.
		PAGE 1 OF 3	
APPROVED	REF. OSC/SYNTH MODULE	PREPARED BY	
		CHECKED BY	
		DATE	

1.0 TEST EQUIPMENT REQUIRED

1.1 Power Supply
A. -28V @ 100 mA
B. ±15V @ ±100 mA

1.2 RF Voltmeter, Boonton 91CA or equivalent.

1.3 75 Ohm Termination

1.4 Patch Cable

1.5 100 MHz Crystal

1.6 10 db 75 Ohm Pad

2.0 MECHANICAL TEST

2.1 Inspect module to insure correct voltages are connected to the correct pins and the "U-link" is in the non-shorting position on the oscillator.

3.0 ELECTRICAL TEST

3.1 Connect module as per Figure 1.

3.2 Power out of the module should be between 25 and 35 mW and the alarm light should be off.

3.3 Short the oscillator with the "U-link" switch.

3.4 The alarm light should illuminate and the power out drop to zero. Replace "U-link" to storage position and the power out will return to level measured in step 3.2.

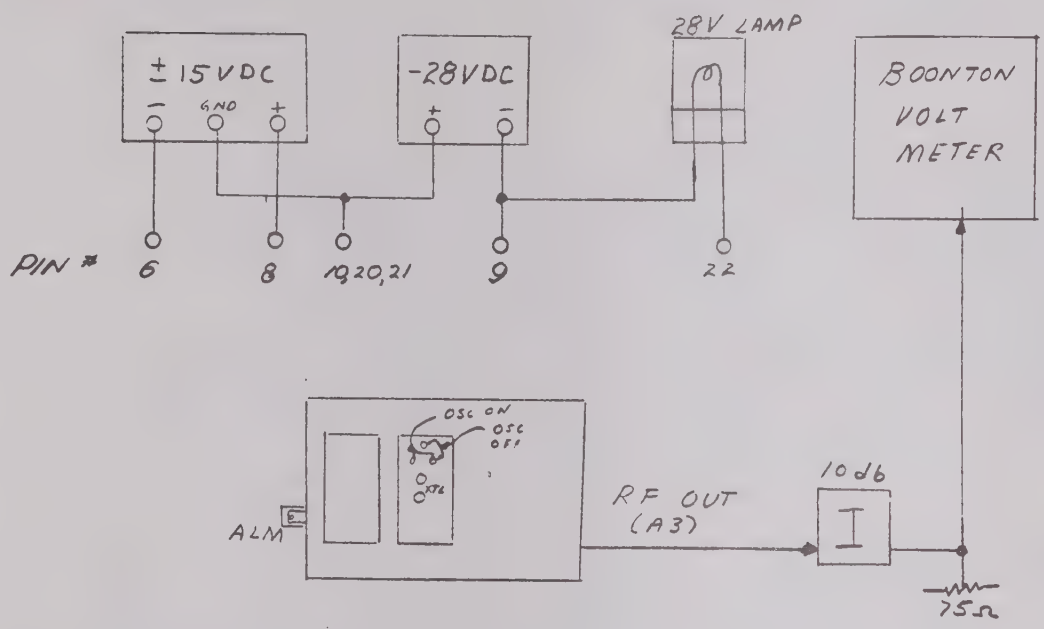
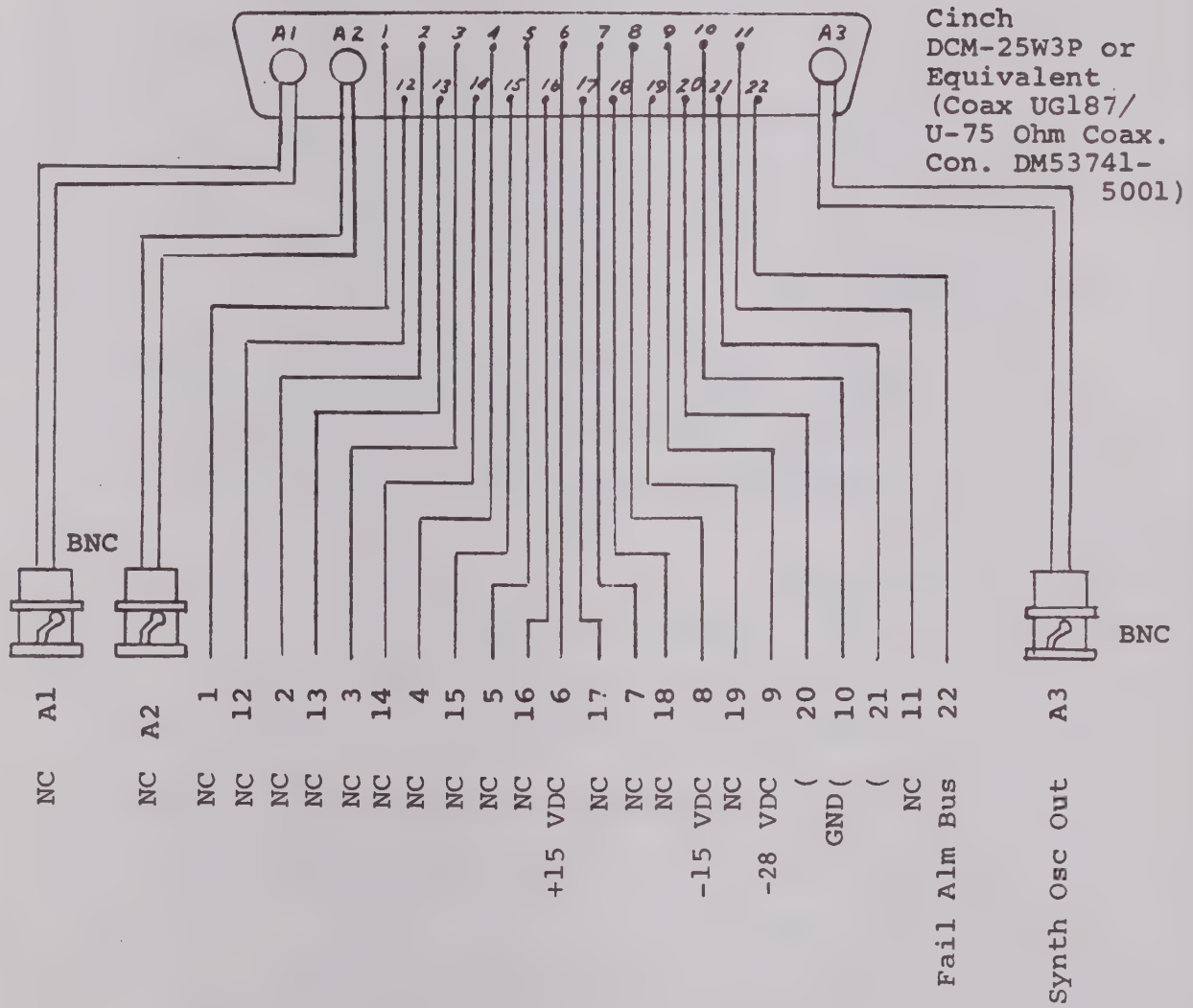

±15VDC
GND
-28VDC
28V LAMP
BOONTON VOLT METER
PIN #
6
8
19,20,21
9
22
OSC ON
OSC OFF
XTAL
ALM
RF OUT (A3)
10 dB
75Ω

FIGURE 1

4.0 APPENDIX

4.1 Patch Cable



TERRA COM Div of Conic Corp.	TEST REQUIREMENTS SPECIFICATION FOR	NO 17021646	REV
APPROVED		PAGE 1 OF 5	
	TRANSMITTER AFC MODULE	PREPARED BY D. Oliver	
		CHECKED BY	
		DATE 2-17-75	

1.0 TEST EQUIPMENT

1.1 Oscilloscope, HP 180A or equivalent.

1.2 Power Supplies, ±15 VDC, -15 DVC, -28 VDC, (2) HP 6205 Dual Supplies or equivalent.

1.3 Transmission Generator, HP 3701A or equivalent.

1.4 Demodulator Display, HP 3702A or equivalent

1.5 75 ohm Termination

1.6 Digital Volt Meter, Data Tech DT-360, or equivalent.

1.7 Video Generator, HP 654A or equivalent.

2.0 MECHANICAL TEST

2.1 Inspect module to insure correct voltages are connected to the correct pins. The "U" link position on the baseband preamplifier should be in the #1 position and the de-emphasis strapped out.

3.0 ELECTRICAL TEST

3.1 Connect equipment as per figure 1.

3.2 Adjust the output of the transmission generator to 70 MHz ±10 kHz at -25 dbm with a sweep width of 8 MHz.

3.3 Adjust R1 on the baseband amplifier to yield 1 Vp-p on the oscilloscope. Note: Be sure the baseband pre-amplifier is in the #1 position and the de-emphasis is strapped out.

3.4 Connect equipment as per figure 2.

3.5 Adjust the transmission generator to 0 sweep width and baseband frequency to "EXT".

3.6 Adjust the video oscillator to 100 kHz and level to ~20 dbm.

3.7 Adjust the "B.B. Power" on the demodulator display until the meter reads 0.

3.8 Adjust the oscillator to 5 MHz and check the drop in modulation response on the demodulator display. The drop should be less than 3 db. Note: The transmission generator has a 1 db drop at 5 MHz.

3.9 Disable the AFC and measure the voltage on Pin 19. Adjust R34 to read -6 VDC on Pin 19.

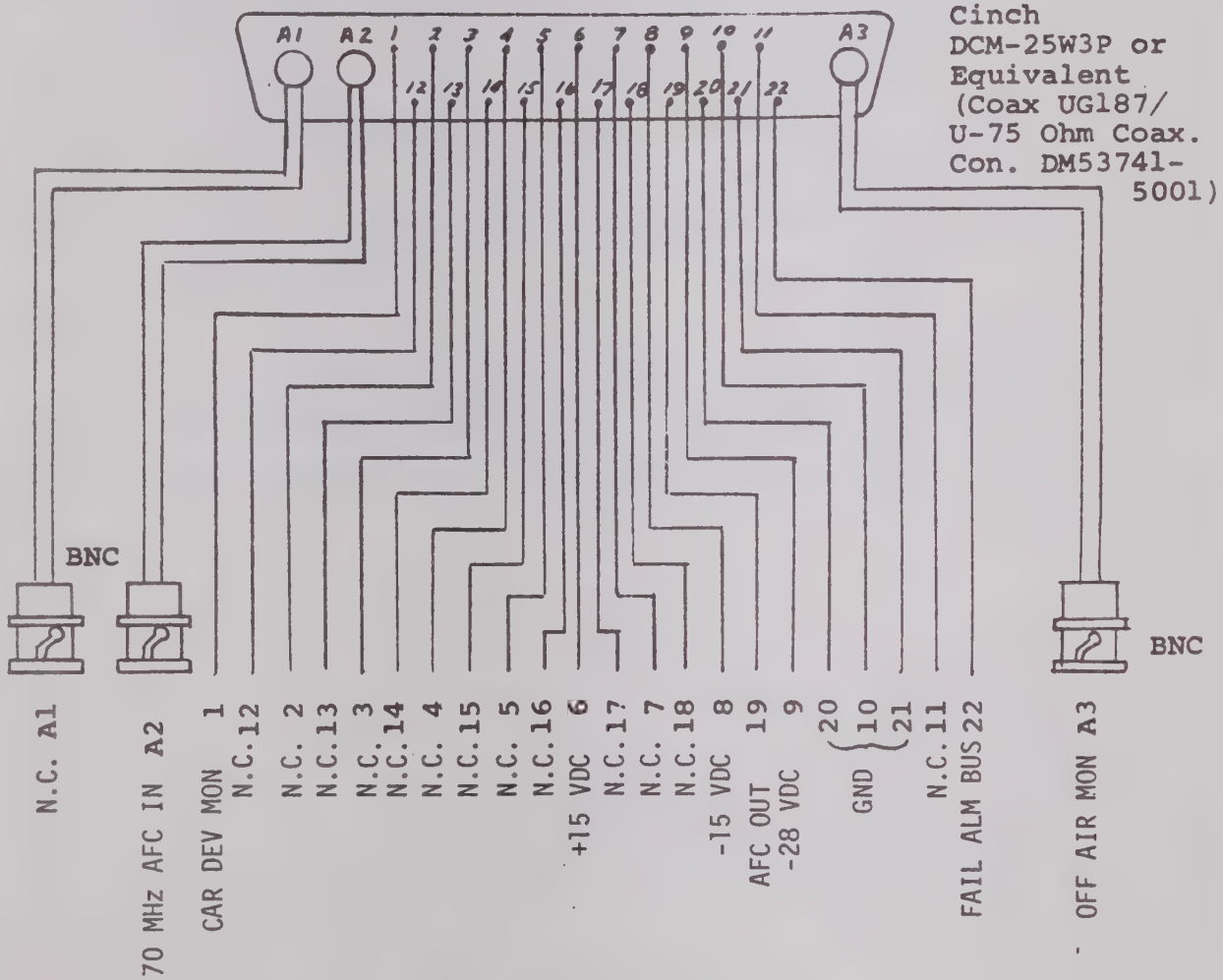
3.10 Disconnect the video oscillator and enable the AFC switch. Adjust R6 on the AFC board to yield -6 VDC on Pin 19.

3.11 Adjust the output of the transmission generator to -3 dbm and -23 dbm. The AFC should remain enabled.

3.12 Disconnect the 70 MHz input. The AFC should disable.

4.0 APPENDIX

4.1 Patch Cable



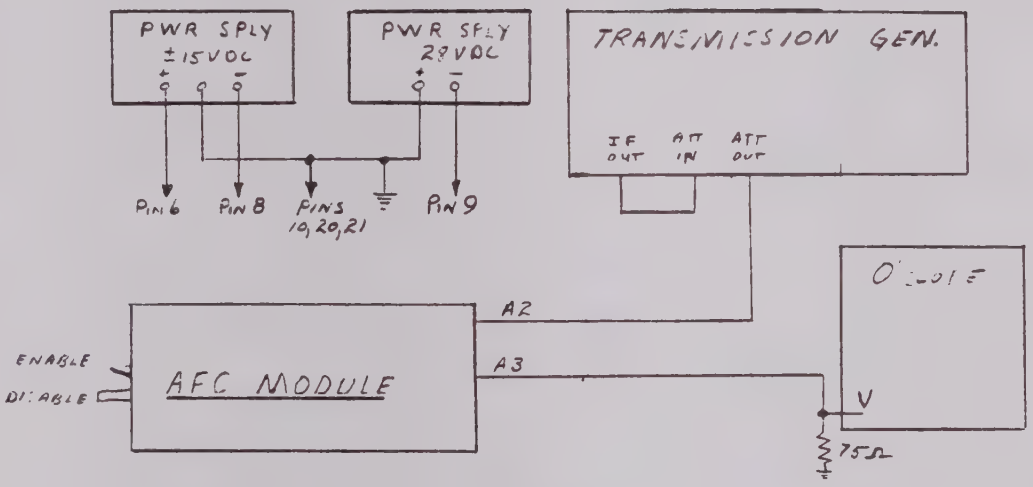

PWR SPLY
±15VDC
PWR SPLY
28VDC
TRANSMISSION GEN.
IF OUT
ATT IN
ATT OUT
PIN 6
PIN 8
PINS 10,20,21
PIN 9
A2
A3
ENABLE
DISABLE
AFC MODULE
V
75Ω

FIGURE 1

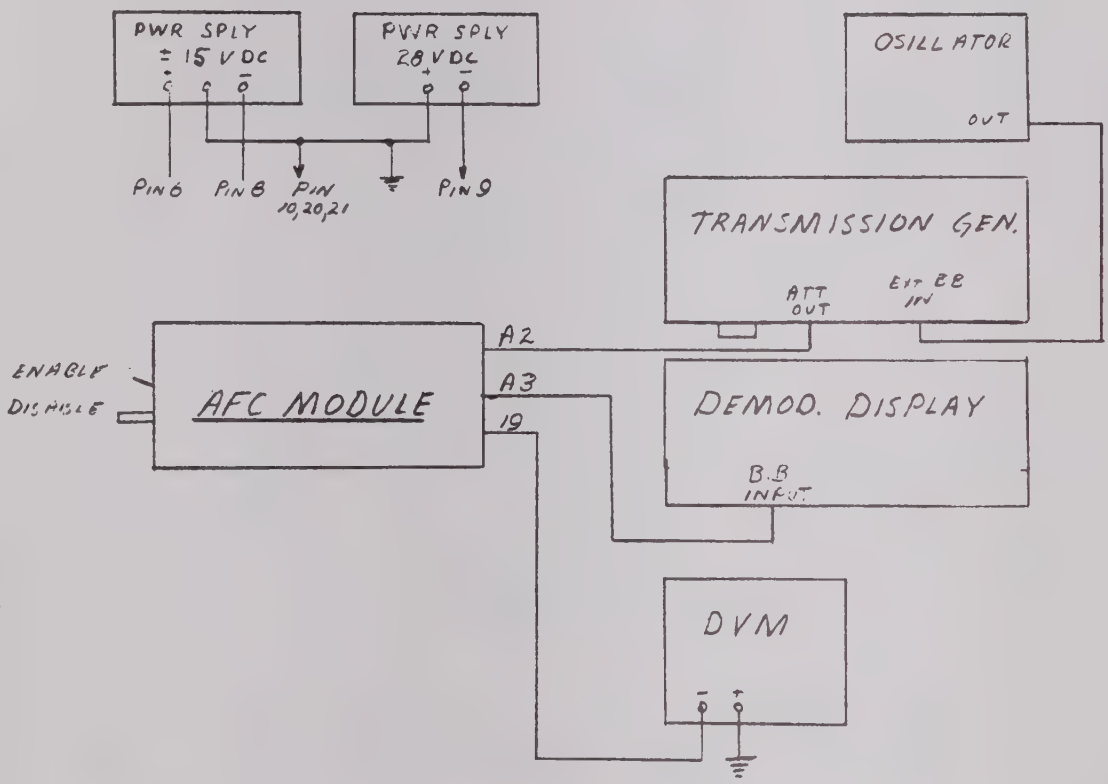

PWR SPLY
± 15 V DC
PWR SPLY
28 V DC
OSILLATOR
OUT
PIN 6
PIN 8
PIN 10,20,21
PIN 9
TRANSMISSION GEN.
ATT OUT
EXT BB IN
ENABLE
DISABLE
AFC MODULE
A2
A3
19
DEMOD. DISPLAY
B.B INPUT
DVM

FIGURE 2

TERRA COM Div of Conic Corp.	TEST REQUIREMENT SPECIFICATIONS	NO 17021647	REV.
		PAGE 1 OF 2	
APPROVED	DIGITAL FREQUENCY SYNTHESIZER 12011647	PREPARED BY F. Borgeson	
		CHECKED BY	
		DATE 8/4/77	

1.0 TEST EQUIPMENT REQUIRED

1.1 Power supplies, +5V, +15V, -15, -28V

1.2 Spectrum analyzer HP

1.3 Frequency counter HP

1.4 Attenuator, RF, Jerrold AV75

1.5 Test cable

1.6 Scope, Tek 475 or equivalent

2.0 MECHANICAL TEST

2.1 Run a visual inspection to verify workmanship and all proper connections.

3.0 ELECTRICAL TEST

3.1 Connect the unit to the power supplies using the test cable.

3.2 Connect the RF output using the attenuator set at 30 dB to the input of the spectrum analyzer.

3.3 Connect an X10 scope probe directly to the output of the unit under test and into the channel 2 input at the scope.

3.4 Connect the channel 2 vertical output of the scope to the input of the counter.

3.5 Set the spectrum analyzer for 0 dBm and 2 MHz/div with center on 100.00 MHz.

3.6 Turn the unit on.

3.7 Remove the -28V lead from the VCO board of the unit.

3.8 Set the unit via the slide switches to 90.000 MHz.

3.9 Observe the output. It should be sweeping from below 93 MHz to above 103 MHz.

3.10 Check the synthesizer at each of the following frequencies for the conditions listed below:

1) 93.000 MHz
2) 97.777 MHz
3) 98.888 MHz
4) 100.000 MHz
5) 103.000 MHz

a) Output on scope when locked min 5V p-p
b) Frequency on counter when locked correct to ±1 kHz.
c) Fault light out when locked.
d) When sweeping output down min 15 dB from locked state.

3.11 Connect the -28V lead to the VCO board.

3.12 Check that when sweeping the livel is down at least 50 dB from the locked condition and the fault light is on.

3.13 Check that when locked all spurious responses around the carrier are down at least 50 dB.

3.14 This completes the test.

SECTION 6

PARTS LISTS

6.1 GENERAL INFORMATION

Parts Lists are arranged in numerical sequence according to the module number. Parts Lists for the PC boards contained in the AC and DC power supplies are included in this section; all other PC board parts lists can be found in the TCM-6 Maintenance Manual.

6.1 INDEX

PL Number	Description
12010028	Remote Enclosure Assembly
12010186	DC-DC Regulator +5V
12010187	DC-DC Regulator +15V
12010189	DC-DC Regulator -28V
12010190	DC Power Supply
12010984	Data Module, NRZ Input
12011582	AC-DC Regulator +5V
12011583	AC-DC Regulator +15V
12011584	AC-DC Regulator -28V
12011586	AC Power Supply Module
12011600	FMR Module
12011640	Transmitter Enclosure
12011642	RF Module
12011643	Control Monitor Module
12011644	Baseband Module
12011645	Synthesizer Module
12011646	AFC Module
12011647	Digital Frequency Synthesizer
12013060	Data Module, B6ZS/AMI Input

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
C1	Capacitor 68 uf 20V	104-0026	Sprague	150D686X902052
C2	Capacitor 68 uf 20V	104-0026	Sprague	150D686X902052
C3	Capacitor 0.1 uf	103-0104	Erie	8131-100-651-104M
C4	Capacitor 0.1 uf	102-0104	Erie	8131-100-651-104M
CR1	Diode	100-0004	H.P.	5082-2800
CR2	Diode	100-0004	H.P.	5082-2800
R1	Resistor 15K 1/4W 5%	112-0153	A.B.	RCR07G153J
R2	Resistor 15K 1/4W 5%	112-0153	A.B.	RCR07G153J
R3	Resistor 220K 1/4W 5%	112-0224	A.B.	RCR07G224J
R4	Resistor 220K 1/4W 5%	112-0224	A.B.	RCR07G224J
R5	Resistor 430K 1/4W 5%	112-0434	A.B.	RCR07G434J
R6	Resistor 50K variable	110-0006	A.B.	A2B503
R7	Resistor 68K 1/4W 5%	112-0683	A.B.	RCR07G683J
R8	Resistor 2K variable	110-0013	A.B.	A2B202
R9	Resistor 100 ohm 1/4W 5%	112-0101	A.B.	RCR97G101J
R10	Resistor 10K variable	110-0004	A.B.	A2B103
R11	Resistor 13K 1/4W 5%	112-0133	A.B.	RCR07G133J
R12	Resistor 10K variable	110-0004	A.B.	A2B103
R13	Resistor 1K 1/4W 5%	112-0102	A.B.	RCR07G102J
R14	Resistor 5K variable	110-0002	A.B.	A2B502
R15	Resistor 2K 1/4W 5%	112-0202	A.B.	RCR07G202J

TRS NO: _____ ASSEMBLY P/N: 137-0169 SHEET 1 OF 1

ASSEMBLY DESCRIPTION REMOTE ENCLOSURE ASSY

REPLACEMENT PART LIST FOR SCHEMATIC 12010028 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9/76

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
C1	Capacitor 2.2 uf 100V	103-2003	Erie	8151-100-651-225M
C2	Capacitor 250 uf 50V	104-0043	Sprague	601D257G050HE4
C3	Capacitor 0.1 uf 100V	103-2004	Erie	8151-100-651-104M
C4	Capacitor 10 uf 60V	104-0051	Sprague	150D106X9060R2
C5	Capacitor 0.1 uf 100V	103-2004	Erie	8151-100-651-104M
C6	Capacitor 0.1 uf 100V	103-2004	Erie	8151-100-651-104M
C7	Capacitor 250 uf 50V	104-0043	Sprague	601D257G050HE4
C8	Capacitor 22 uf 35V	104-0025	Sprague	105D226X9035R2
C9	Capacitor 2.2 uf 100V	103-2003	Erie	8151-100-651-225M
CR1	Diode NOT USED			
CR2	Diode	100-0136	GE	A115B
CR3	Diode	100-0136	GE	A115B
CR4	Diode Zener 11V	100-0096	Motorola	IN5241B
CR5	Diode	100-0001	Amperex	IN4148
CR6	Diode	100-0001	Amperex	IN4148
CR7	Diode Zener 4.3V	100-0084		IN5229B
CR8	Diode	100-0006	Motorola	IN4002
CR9	Diode	100-0001	Amperex	IN4148
CR10	Diode	100-0006	Motorola	IN4002
CR11	Diode	100-0006	Motorola	IN4002

TRS NO: 17020186 ASSEMBLY P/N: 152-0314 SHEET 1 OF 3

ASSEMBLY DESCRIPTION DC REGULATOR BOARD ±5 VDC POWER SUPPLY

REPLACEMENT PART LIST FOR SCHEMATIC 12010186 REV. C

ELECTRICAL RELEASE 15-9-76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
CR12	Diode	100-0135	G.E.	A114B
CR13	Diode	100-0135	G.E.	A114B
L1	Coil 2 mh shielded	129-0033		
Q1	Transistor	101-0069		2N5985
Q2	Transistor	101-0069		2N5985
Q3	Transistor SCR	101-0080		2N1596
Q4	Transistor	101-0057		2N2102
Q5	Transistor	101-0072		2N6055
Q6	Transistor	101-0010		2N2905
R1	Resistor 510 ohm 1/2W 5%	113-0511	AB	RCR20G511J
R2	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R3	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R4	Pot 500 ohm	110-0023	Spectrol	43P-501
R5	Resistor 3K 1/4W 5%	112-0302	AB	RCR07G302J
R6	Resistor 1 ohm 1/2W 5%	113-01R0	AB	RCR20G1R0J
R7	Resistor 1 ohm 1/2W 5%	113-01R0	AB	RCR20G1R0J
R8	Resistor 1 ohm 1/2W 5%	113-01R0	AB	RCR20G1R0J
R9	Resistor 10 ohm 1/4W 5%	112-0100	AB	RCR07G100J

TRS NO: 17020186 ASSEMBLY P/N: 152-0314 SHEET 2 OF 3

ASSEMBLY DESCRIPTION DC REGULATOR BOARD ±5 VDC POWER SUPPLY

REPLACEMENT PART LIST FOR SCHEMATIC 12010186 REV. C

ELECTRICAL RELEASE 15-9-76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
R10	Pot 2K 10%	110-0021	Spectrol	43P-202
R11	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R12	Resistor 1K 1/4W 5%	112-0102	AB	RCRo7G102J
R13	Pot 500 ohm	110-0023	Spectrol	43P-501
R14	Resistor 2K 1/4W 5%	112-0202	AB	RCR07G202J
R15	Resistor 2.2K 1/4W 5%	112-0222	AB	RCR07G222J
R16	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R17	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R18	Resistor 2K 1/4W 5%	112-0202	AB	RCR07G202J
R19	Resistor 10K 1/4W 5%	112-0103	AB	RCR07G103J
R20	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R21	Resistor 1.3K 1/4W 5%	112-0132	AB	RCR07G132J
R22	Resistor 10 ohm 1/4W 5%	112-0100	AB	RCR07G100J
R23	Thermistor 10K ± 1%	114-0036	AB	BA110T2MAW2F
R24	Resistor 30K 1/4W 5%	112-0303	AB	RCR07G303J
R25	Resistor 22K 1/4W 5%	112-0223	AB	RCR07G223J
R26	Resistor 430 ohm 1/4W 5%	112-0431	AB	RCR07G431J
Z1	IC	102-0022	Motorola	MC1723G
Z2	IC	102-0022	Motorola	MC1723G

TRS NO: 17020186 ASSEMBLY P/N: 152-0314 SHEET 3 OF 3

ASSEMBLY DESCRIPTION DC REGULATOR BOARD ±5 VDC POWER SUPPLY

REPLACEMENT PART LIST FOR SCHEMATIC 12010186 REV. C

ELECTRICAL RELEASE 15-9-76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
C1	Capacitor 2.2 uf	103-2003	Erie	8151-100-651-225M
C2	Capacitor 250 uf 50V	104-0043	Sprague	601D2576050HE4
C3	Capacitor .1 uf	103-2004	Erie	8121-100-651-104M
C4	Capacitor 10 uf	104-0051	Sprague	150D106X9060R2
C5	Capacitor .1 uf	103-2004	Erie	8121-100-651-104M
C6	Capacitor .1 uf	103-2004	Erie	8121-100-651-104M
C7	Capacitor 250 uf 50V	104-0043	Sprague	601D257G050HE4
C8	Capacitor 22 uf	104-0025	Sprague	150D226X9035R2
C9	Capacitor 2.2 uf	103-2003	Erie	8151-100-651-225M
CR1	NOT USED			
CR2	Diode	100-0136	GE	A115B
CR3	Diode	100-0136	GE	A115B
CR4	Diode Zener	100-0107	I.T.T.	IN5252B
CR5	Diode	100-0001	Amperex	IN4148
CR6	Diode	100-0001	Amperex	IN4148
CR7	Diode Zener	100-0092	Motorola	IN5237B
CR8	Diode	100-0006	I.T.T.	IN4002
CR9	Diode Zener	100-0092	Motorola	IN5237B
CR10	Diode	100-0006	I.T.T.	IN4002
CR11	Diode	100-0006	I.T.T.	IN4002

TRS NO: 17020187 ASSEMBLY P/N: 152-0315 SHEET 1 OF 3

ASSEMBLY DESCRIPTION REGULATOR DC POWER SUPPLY 15V

REPLACEMENT PART LIST FOR SCHEMATIC 12010187 REV. _____

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE _____

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
CR12	Diode	100-0135	GE	A114B
CR13	Diode	100-0135	GE	A114B
L1	Coil 2 mh shielded	129-0033		
Q1	Transistor	101-0069	Motorola	2N5985
Q2	Transistor	101-0069	Motorola	2N5985
Q3	SCR	101-0080	Motorola	2N1596
Q4	Transistor	101-0057	National	2N2102
Q5	Transistor	101-0072	Motorola	2N6055
Q6	Transistor	101-0010	I.T.T.	2N2905
R1	Resistor 1K 1/2W 5%	113-01R0	AB	RCR20G102J
R2	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R3	Resistor 56K 1/4W 5%	112-0563	AB	RCR07G563J
R4	Pot 500 ohm Variable	110-0023	Spectrol	43P-501
R5	Resistor 5.6K 1/4W 5%	112-0562	AB	RCR07G562J
R6	Resistor 1 ohm 1/2W	113-01R0	AB	RCR20G1R0J
R7	Resistor 1 ohm 1/2W	113-01R0	AB	RCR20G1R0J
R8	Resistor 1 ohm 1/2W	113-01R0	AB	RCR20G1R0J
R9	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J

TRS NO: 17020187 ASSEMBLY P/N: 152-0315 SHEET 2 OF 3

ASSEMBLY DESCRIPTION REGULATOR DC POWER SUPPLY 15V

REPLACEMENT PART LIST FOR SCHEMATIC 12010187 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9/76

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
R10	Pot 2K Variable	110-0021	Spectrol	43P-202
R11	Resistor 1K 1/2W	113-0102	AB	RCR20G102J
R12	Resistor 2.7K 1/4W 5%	112-0272	AB	RCR07G272J
R13	Pot 500 ohm Variable	110-0023	Spectrol	43P-201
R14	Resistor 470 ohm 1/4W 5%	112-0471	AB	RCR07G471J
R15	Resistor 3.3K 1/4W 5%	112-0332	AB	RCR07G332J
R16	Resistor 4.7K 1/4W 5%	112-0472	AB	RCR07G472J
R17	Resistor 3.0K 1/4W 5%	112-0302	AB	RCR07G302J
R18	Resistor 2K 1/4W 5%	112-0202	AB	RCR07G202J
R19	Resistor 22K 1/4W 5%	112-0223	AB	RCR07G223J
R20	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R21	Resistor 680 ohm 1/4W 5%	112-0681	AB	RCR07G681J
R22	Resistor 2.4K 1/4W 5%	112-0242	AB	RCR07G242J
R23	Thermistor 10K 1%	114-0036	Ballo	BALCOT2MAW2F
R24	NOT USED			
R25	Resistor 22K 1/4W 5%	112-0223	AB	RCR07G223J
R26	Resistor 430 ohm 1/4W 5%	112-0431	AB	RCR07G431J
Z1	IC	102-0022	Motorola	MC1723G
Z2	IC	102-0022	Motorola	MC1723G

TRS NO: 17020187 ASSEMBLY P/N: 152-0315 SHEET 3 OF 3

ASSEMBLY DESCRIPTION REGULATOR DC POWER SUPPLY 15V

REPLACEMENT PART LIST FOR SCHEMATIC 12010187 REV. _____

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE _____

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
C1	Capacitor 2.2 uf	103-2003	Erie	8151-100-651-225M
C2	Capacitor 250 uf 50V	104-0043	Sprague	601D257G050HE4
C3	Capacitor 0.1 uf	103-2004	Erie	8121-100-651-104M
C4	Capacitor 10 uf 60V	104-0051	Sprague	150D106X9060R2
C5	Capacitor 0.1 uf	103-2004	Erie	8121-100-651-104M
C6	Capacitor 0.1 uf	103-2004	Erie	8121-100-651-104M
C7	Capacitor 250 uf 50V	104-0043	Erie	601D257G050HE4
C8	Capacitor 22 uf 35V	104-0025	Sprague	150D226X9035R2
C9	Capacitor 2.2 uf	103-2003	Erie	8151-100-651-225M
CR1	NOT USED			
CR2	Diode	100-0136	GE	A115B
CR3	Diode	100-0136	GE	A115B
CR4	Diode Zener	100-0113	Motorola	IN5258B
CR5	Diode	100-0001	Amperex	IN4148
CR6	Diode	100-0001	Amperex	IN4148
CR7	Diode Zener	100-0098	I.T.T.	IN5243B
CR8	Diode	100-0006	I.T.T.	IN4002
CR9	Diode Zener	100-0098	I.T.T.	IN5243B
CR10	Diode	100-0006	I.T.T.	IN4002
CR11	Diode	100-0006	I.T.T.	IN4002

TRS NO: 17020189 ASSEMBLY P/N: 152-0316 SHEET 1 OF 3

ASSEMBLY DESCRIPTION REGULATOR DC POWER SUPPLY 28V

REPLACEMENT PART LIST FOR SCHEMATIC 12010189 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9/76

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
CR12	Diode	100-0135	GE	A114B
CR13	Diode	100-0136	GE	A114B
L1	Coil 2 mh	129-0033		
Q1	Transistor	101-0069	Motorola	2N5985
Q2	Transistor	101-0069	Motorola	2N5985
Q3	Transistor	101-0080	Motorola	2N1596
Q4	Transistor	101-0057	National	2N2102
Q5	Transistor	101-0072	Motorola	2N6055
Q6	Transistor	101-0010	Motorola	2N2905
R1	Resistor 4.7K 1/2W 5%	113-0472	AB	RCR20G472J
R2	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R3	Resistor 56K 1/4W 5%	112-0563	AB	RCR07G563J
R4	Pot 500 ohm Variable	110-0023	Spectrol	43P-501
R5	Resistor 5.6K 1/4W 5%	112-0562	AB	RCR07G562J
R6	Resistor 1 ohm 1/2W 5%	113-01R0	AB	RCR20G1R0J
R7	Resistor 1 ohm 1/2W 5%	113-01R0	AB	RCR20G1R0J
R8	Resistor 1 ohm 1/2W 5%	113-01R0	AB	RCR20G1R0J
R9	Resistor 3.3K 1/4W 5%	112-0332	AB	RCR07G332J

TRS NO: 17020189 ASSEMBLY P/N: 152-0316 SHEET 2 OF 3

ASSEMBLY DESCRIPTION REGULATOR DC POWER SUPPLY 28V

REPLACEMENT PART LIST FOR SCHEMATIC 12010189 REV. _____

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE _____

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
R10	Pot 2K Variable	110-0021	Spectrol	43P-202
R11	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R12	Resistor 7.5K 1/4W 5%	112-0752	AB	RCR07G752J
R13	Pot 500 ohm Variable	110-0023	Spectrol	43P-501
R14	Resistor 470 ohm 1/4W 5%	112-0471	AB	RCR07G471J
R15	Resistor 5.6K 1/4W 5%	112-0562	AB	RCR07G562J
R16	Resistor 4.7K 1/4W 5%	112-0472	AB	RCR07G472J
R17	Resistor 3.0K 1/4W 5%	112-0302	AB	RCR07G302J
R18	Resistor 2K 1/4W 5%	112-0202	AB	RCR07G202J
R19	Resistor 22K 1/4W 5%	112-0223	AB	RCR07G223J
R20	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R21	Resistor 300 ohm 1/4W 5%	112-0301	AB	RCR07G301J
R22	Resistor 1.3K 1/4W 5%	112-0132	AB	RCR07G132J
R23	Thermistor 10K	114-0036	Balco	BALCO T2 MAW 2F
R24	NOT USED			
R25	Resistor 22K 1/4W 5%	112-0223	AB	RCR07G223J
R26	Resistor 430 ohm 1/4W 5%	112-0431	AB	RCR07G431J
Z1	IC	102-0022	Motorola	MC1723G
Z2	IC	102-0022	Motorola	MC1723G

TRS NO: 17020189 ASSEMBLY P/N: 152-0316 SHEET 3 OF 3

ASSEMBLY DESCRIPTION REGULATOR DC POWER SUPPLY 28V

REPLACEMENT PART LIST FOR SCHEMATIC 12010189 REV.

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
C1	Capacitor 200 pf 500V	108-5201	Elmenco	CM04ED500J
C2	Capacitor 10 uf 60V	104-0051	Sprague	150D106X9060R2
C3	Capacitor .015 uf 50V	109-0038	Sprague	192P15392
C4	Capacitor 1000 pf 100V	103-0102	Erie	8121-100-W5R0-102K
C5	Capacitor 22 uf 15V	104-0027	Sprague	150D226X9015
C6	Capacitor 22 uf 35V	104-0025	Sprague	150D226X9035R2
C7	Capacitor 0.1 uf 100V	103-2004	Erie	8131-100-651-104M
C8	Capacitor 0.1 uf 100V	103-2004	Erie	8131-100-651-104M
C9	Capacitor 10 uf 75V	104-0067	Sprague	150D106X0075R2
C10	Capacitor 2.2 uf 100V	103-2003	Erie	8151-100-651-225M
C11	Capacitor 800 uf 75V	104-0042	Sprague	601D807F075JT4
C12	Capacitor 1.0 uf 50V	103-0105	Erie	8131-050-651-105M
C13	Capacitor 100 uf 20V	104-0066	Sprague	150D107X9020R2
C14	Capacitor 1.0 uf 50V	103-0105	Erie	8131-050-651-105M
C15	Capacitor 100 uf 50V	104-0040	CDE	NLW100-50
C16	Capacitor 1.0 uf 50V	103-0105	Erie	8131-050-651-105M
C17	Capacitor 0.1 uf 100V	103-2004	Erie	8131-100-651-104M
C18	Capacitor 0.1 uf 100V	103-2004	Erie	8131-100-651-104M
C19	Capacitor 0.1 uf 100V	103-2004	Erie	8131-100-651-104M
C20	Capacitor 0.1 uf 100V	103-2004	Erie	8131-100-651-104M
C21	Capacitor 0.1 uf 100V	103-2004	Erie	8131-100-651-104M

TRS NO: 17020190 ASSEMBLY P/N: 152-0317 SHEET 1 OF 6

ASSEMBLY DESCRIPTION DC POWER SUPPLY (MOTHERBOARD)

REPLACEMENT PART LIST FOR SCHEMATIC 12010190 REV. A

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
C22	Capacitor 0.1 uf 100V	103-2004	Erie	8131-100-651-104M
C23	Capacitor 0.1 uf 100V	103-2004	Erie	8131-100-651-104M
C24	Capacitor 0.1 uf 100V	103-2004	Erie	8131-100-651-104M
CR1	Diode	100-0001	GE	IN4148
CR2	Diode	100-0086	Motorola	IN5231B
CR3	Diode Zener 17V	100-0103	Motorola	IN5247B
CR4	Diode Zener 35V	100-0112	Motorola	IN5257B
CR5	Diode	100-0006	Motorola	IN4002
CR6	Diode Zener 24V 1.5W	100-0132	Motorola	IN3798B
CR7	Diode	100-0135	GE	A114B
CR8	Diode	100-0135	GE	A114B
CR9	Diode	100-0001	GE	IN4148
CR10	Diode	100-0001	GE	IN4148
CR11	Diode	100-0001	GE	IN4148
CR12	Diode	100-0135	GE	A114B
CR13	Diode	100-0135	GE	A114B
CR14	Diode	100-0006	GE	IN4002
CB1	Circuit Breaker	125-0065	Airpay	APG 11-4511-1

TRS NO: 17020190 ASSEMBLY P/N: 152-0317 SHEET 2 OF 6

ASSEMBLY DESCRIPTION DC POWER SUPPLY (MOTHERBOARD)

REPLACEMENT PART LIST FOR SCHEMATIC 12010190 REV. A

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
K1	Relay Spot 24V	125-0064	NAP Control	28H113AG
K2	Relay DPDT	125-0026	P&B	KNP-11021-24J
L1	Coil 0.1 Mh	129-0023		
L2	Coil 0.1 Mh	129-0023		
L3	Coil 300 Mh	129-0010		
L4	Coil 10 Mh	129-0009	TerraCom	
L5	Coil 0.5 Mh	129-0024		
L6	Coil 0.5 Mh	129-0024		
L7	Coil 0.5 Mh	129-0024		
L8	Coil 0.5 Mh	129-0024		
Q1	Transistor	101-0062	Motorola	2N4852
Q2	Transistor	101-0057	National	2N2102
Q3	Transistor	101-0057	National	2N2102
Q4	Transistor	101-0081	GE	D44R2
Q5	Transistor	101-0071	RCA	2N6496
Q6	Transistor	101-0069	Motorola	2N5985
Q7	Transistor	101-0057	CE	2N2102
Q8	Transistor	101-0057	CE	2N2102
Q9	Transistor	101-0057	CE	2N2102

TRS NO: 17020190 ASSEMBLY P/N: 152-0317 SHEET 3 OF 6

ASSEMBLY DESCRIPTION DC POWER SUPPLY (MOTHERBOARD)

REPLACEMENT PART LIST FOR SCHEMATIC 12010190 REV. A

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
Q10	Transistor	101-0081	GE	D44R2
Q11	Transistor	101-0071	RCA	2N6496
Q12	Transistor	101-0010	I.T.T.	2N2905
Q13	Transistor	101-0010	I.T.T.	2N2905
R1	Resistor 47K ohm 1/4W 5%	112-0473	AB	RCR07G473J
R2	Resistor 3.3K 1/4W 5%	112-0332	AB	RCR07G332J
R3	Resistor 7.5K 1/4W 5%	112-0752	AB	RCR07G752J
R4	Resistor 470 ohm 1/4W 5%	112-0471	AB	RCR07G471J
R5	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R6	Resistor 1.5K 1/4W 5%	112-0152	AB	RCR07G152J
R7	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R8	Resistor 150 ohm 1/4W 5%	112-0151	AB	RCR07G151J
R9	Resistor 22K 1/4W 5%	112-0223	AB	RCR07G223J
R10	Resistor 470 ohm 1/4W 5%	112-0471	AB	RCR07G471J
R11	Resistor 120 ohm 1/4W 5%	112-0121	AB	RCR07G121J
R12	Resistor 300 ohm 3W	114-0029	Sprague	450-E-3015
R13	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R14	Resistor 240 ohm 1/4W 5%	112-0241	AB	RCR07G241J
R15	Resistor 1K 1/2W	113-0102	AB	RCR32G102J
R16	Resistor 1K 1W	114-0019	AB	RCR32G102J

TRS NO: 17020190 ASSEMBLY P/N: 152-0317 SHEET 4 OF 6

ASSEMBLY DESCRIPTION DC POWER SUPPLY (MOTHERBOARD)

REPLACEMENT PART LIST FOR SCHEMATIC 12010190 REV. A

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
R17	Resistor 4.7K 1/4W 5%	112-0472	AB	RCR07G472J
R18	Resistor 10K 1/4W 5%	112-0103	AB	RCR07G103J
R19	Resistor 5.1K 1/4W 5%	112-0512	AB	RCR07G512J
R20	Resistor 82 ohm 1/2W	113-0820	AB	RCR20G820J
R21	Resistor 240 ohm 1/4W 5%	112-0241	AB	RCR07G241J
R22	Resistor 1K 1/2W	113-0102	AB	RCR20G102J
R23	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R24	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R25	Resistor 500 ohm 1/4W 5%	110-0015	Bourns	3339P-1-501
R26	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R27	Resistor 130 ohm 1W	114-0037	AB	RCR20G131J
R28	Resistor 47K 1/4W 5%	112-0473	AB	RCR07G473J
R29	Resistor 1.5K 1/2W	113-0152	AB	RCR20G152J
R30	Resistor 82 1/2W	113-0820	AB	RCR20G820J
R31	Resistor 100K 1/4W 5%	112-0104	AB	RCR07G104J
R32	Resistor 47K 1/4W 5%	112-0473	AB	RCR07G473J
R33	Resistor 10K 1/4W 5%	112-0103	AB	RCR07G103J
R34	Resistor - NOT USED			
Z1	IC 723	102-0022	Motorola	MC1723G
Z2	IC 723	102-0022	Motorola	MC1723G

TRS NO: 17020190 ASSEMBLY P/N: 152-0317 SHEET 5 OF 6

ASSEMBLY DESCRIPTION DC POWER SUPPLY (MOTHERBOARD)

REPLACEMENT PART LIST FOR SCHEMATIC 12010190 REV. A

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
Z3	IC 5472	102-0019	T.I.	SN5472J
Z4	IC 5400	102-0020	T.I.	SN5400J
	Transformer PC Assy	152-0306	T/C	12010195
	Input Board Assy	152-0408	T/C	12010200
	Voltage Select Board	153-0214	T/C	12010192

TRS NO: 17020190 ASSEMBLY P/N: 152-0317 SHEET 6 OF 6

ASSEMBLY DESCRIPTION DC POWER SUPPLY (MOTHERBOARD)

REPLACEMENT PART LIST FOR SCHEMATIC 12010190 REV. A

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
	Transistor	101-0069	Moto	2N5985
	Transistor	101-0071	RCA	2N6496
	Relay DPDT	125-0026	P & B	KNP-11021-24V
	Circuit Breaker, DC	125-0065	Airpay	APG-11-4511-1
	Filter, Feed Thru	131-0017	Erie	9050-000-0000
	Lamp Lens, Red	132-0001	Eldema	RL090RC
	Lamp Lens, Amber	132-0003	Eldema	RL090AC
	Lamp bulb	132-0024	GE	327
	Fuse 1/2A Slo-Blo	132-0026	Littlefuse	313.500
	Extender Board	152-0138	T/C	12011585
	Regulator 15V DC-DC	152-0315	T/C	12010187
	Regulator 28V DC-DC	152-0316	T/C	12010189
	Regulator 5V DC-DC	152-0314	T/C	
	Mother Board, Pwr. Supply	152-0317	T/C	12010190
	Transformer PC Assy	152-0306	T/C	12010195
	Input Board Assy	152-0408	T/C	12010200
	Voltage Selector Bd	153-0214	T/C	12010192

TRS NO: _____ ASSEMBLY P/N: 130-0232 SHEET 1 OF 1

ASSEMBLY DESCRIPTION DC Power Supply (Basic)

REPLACEMENT PART LIST FOR SCHEMATIC 12010190 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9 76

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
C1	Capacitor 250 uf 50V	104-0043	Sprague	601D257G050HE4
C2	Capacitor 250 uf 50V	104-0043	Sprague	601D257G020HE4
C3	Capacitor 2200uf 50V	104-0062	Sprague	601D
C4	Capacitor 0.1 uf	103-2004	Erie	8131-100-6510104M
C5	Capacitor 10 uf 60V	104-0067	Sprague	150D106X9060R2
C6	Capacitor 0.1 uf	103-2004	Erie	8131-100-651-104M
C7	Capacitor 250 uf 50V	104-0043	Sprague	601D257G050HE4
C8	Capacitor 10 uf 60V	104-0067	Sprague	150D106X9060R2
C9	Capacitor 0.1 uf	103-2004	Erie	8131-100-651-104M
CR1	Full Wave Bridge Diode	100-0066	Motorola	MDA-970-2
CR2	Diode	100-0006	Motorola	IN4002
CR3	Diode	100-0006	Motorola	IN4002
CR4	Diode Zener 13V 5%	100-0098	Motorola	IN5243B
CR5	Diode Zener 5.1V 5%	100-0086	Motorola	IN5231B
CR6	Diode	100-0006	Motorola	IN4002
CR7	Diode	100-0006	Motorola	IN4002
CR8	Diode	100-0006	Motorola	IN4002
Q1	Transistor	101-0069	Motorola	2N5985
Q2	Transistor	101-0069	Motorola	2N5985

TRS NO: 17021582 ASSEMBLY P/N: 152-0135 SHEET 1 OF 3

ASSEMBLY DESCRIPTION AC TO DC REGULATOR 5 VOLT

REPLACEMENT PART LIST FOR SCHEMATIC 12011582 REV. F2

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
Q3	Transistor	101-0057	National	2N2102
Q4	Transistor	101-0057	National	2N2102
Q5	Transistor	101-0072	Motorola	2N6055
Q6	Transistor	101-0010	I.T.T.	2N2905
R1	Resistor 1K 1W 5%	114-0019	AB	RCR32G102J
R2	Resistor 1 ohm 1/2W 5%	113-01R0	AB	RCR20G1R0J
R3	Resistor 1 ohm 1/2W 5%	113-01R0	AB	RCR20G1R0J
R4	Resistor 1 ohm 1/2W 5%	113-01R0	AB	RCR20G1R0J
R5	Resistor 620 ohm 1/4W 5%	112-0621	AB	RCR07G621J
R6	Resistor 620 ohm 1/4W 5%	112-0621	AB	RCR07G621J
R7	Pot 500 ohm Variable	110-0023	Spectrol	43P501
R8	Resistor 3K 1/4W 5%	112-0302	AB	RCR07G302J
R9	NOT USED			
R10	Pot 2K Variable	110-0021	Spectrol	43P202
R11	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R12	Resistor 4.7K 1/4W 5%	112-0102	AB	RCR07G102J
R13	Resistor 4.7K 1/4W 5%	112-0102	AB	RCR07G102J
R14	Resistor 4.7K 1/4W 5%	112-0102	AB	RCR07G102J
R15	Resistor 10K 1/4W 5%	112-0103	AB	RCR07G103J
R16	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J

TRS NO: 17021582 ASSEMBLY P/N: 152-0135 SHEET 2 OF 3

ASSEMBLY DESCRIPTION AC TO DC REGULATOR 5 VOLT

REPLACEMENT PART LIST FOR SCHEMATIC 12011582 REV. F2

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
R17	Resistor 1.3K 1/4W 5%	112-0132	AB	RCR07G132J
R18	NOT USED			
R19	Resistor 22K 1/4W 5%	112-0223	AB	RCR07G223J
R20	Resistor 30K 1/4W 5%	112-0303	AB	RCR07G303J
R21	Thermistor 10K 1%	114-0036	Balco	BACOT2MAW2F
Z1	IC	102-0022	Motorola	MC1723G

TRS NO: 17021582 ASSEMBLY P/N: 152-0135 SHEET 3 OF 3

ASSEMBLY DESCRIPTION AC TO DC REGULATOR 5 VOLT

REPLACEMENT PART LIST FOR SCHEMATIC 12011582 REV. F2

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
C1	Capacitor 250 uf 50V	104-0043	Sprague	601D257G050HE4
C2	Capacitor 250 uf 50V	140-0043	Sprague	601D257G050HE4
C3	Capacitor 2300uf 40V	104-0044	Sprague	601D238G040JT4
C4	Capacitor 0.1 uf 100V	103-2004	Erie	8131-100-651-104M
C5	Capacitor 10 uf 60V	104-0051	Sprague	150D106X9060R2
C6	Capacitor 0.1 uf 100V	103-2004	Erie	8131-100-651-104M
C7	Capacitor 250 uf 50V	104-0043	Sprague	601D257G050HE4
C8	Capacitor 10 uf 60V	104-0051	Sprague	150D106X9060R2
C9	Capacitor 0.1 uf 100V	103-2004	Erie	8131-100-651-104M
CR1	Diode Full Wave Bridge	100-0066	Motorola	MDA-970-2
CR2	Diode	100-0006	Motorola	IN4002
CR3	Diode	100-0006	Motorola	IN4002
CR4	Diode Zener 24V 5%	100-0107	Motorola	IN5252B
CR5	Diode Zener 15V 5%	100-0100	Motorola	IN5245B
CR6	Diode	100-0006	Motorola	IN4002
CR7	Diode	100-0006	Motorola	IN4002
CR8	Diode	100-0006	Motorola	IN4002
Q1	Transistor	101-0069	Motorola	2N5985
Q2	Transistor	101-0069	Motorola	2N5985

TRS NO: 17021583 ASSEMBLY P/N: 152-0136 SHEET 1 OF 3

ASSEMBLY DESCRIPTION AC TO DC REGULATOR 15 VOLT

REPLACEMENT PART LIST FOR SCHEMATIC 12011583 REV. F1

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
Q3	Transistor	101-0057	National	2N2102
Q4	Transistor	101-0057	National	2N2102
Q5	Transistor	101-0072	Motorola	2N6055
Q6	Transistor	101-0010	I.T.T.	2N2905
R1	Resistor 4.7K 1W 5%	114-0045	AB	RCR32G472J
R2	Resistor 1 ohm 1/2W 5%	113-01R0	AB	RCR20G1R0J
R3	Resistor 1 ohm 1/2W 5%	113-01R0	AB	RCR20G1R0J
R4	Resistor 1 ohm 1/2W 5%	113-01R0	AB	RCR20G1R0J
R5	Resistor 10K 1/4W 5%	112-0103	AB	RCR07G103J
R6	NOT USED			
R7	Pot 500 ohm Variable	110-0023	Spectrol	43P-501
R8	Resistor 5.6K 1/4W 5%	112-0562	AB	RCR07G562J
R9	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R10	Pot 2K Variable	110-0021	Spectrol	43P-202
R11	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R12	Resistor 4.7K 1/4W 5%	112-0472	AB	RCR07G472J
R13	Resistor 4.7K 1/4W 5%	112-0472	AB	RCR07G472J
R14	Resistor 4.7K 1/4W 5%	112-0472	AB	RCR07G472J
R15	Resistor 10K 1/4W 5%	112-0103	AB	RCR07G103J
R16	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J

TRS NO: 17021583 ASSEMBLY P/N: 152-0136 SHEET 2 OF 3

ASSEMBLY DESCRIPTION AC TO DC REGULATOR 15 VOLT

REPLACEMENT PART LIST FOR SCHEMATIC 12011583 REV. F1

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
R17	Resistor 680 ohm 1/4W 5%	112-0681	AB	RCR07G681J
R18	Resistor 2. K 1/4W 5%	112-0242	AB	RCR07G242J
R19	Resistor 22K 1/4W 5%	112-0223	AB	RCR07G223J
R20	NOT USED			
R21	Thermistor 10K 1%	114-0036	BALCO	BALCOT2MAW2F
Z1	IC	102-0022	Motorola	MC1723G

TRS NO: 17021583 ASSEMBLY P/N: 152-0136 SHEET 3 OF 3

ASSEMBLY DESCRIPTION AC TO DC REGULATOR 15 VOLT

REPLACEMENT PART LIST FOR SCHEMATIC 12011583 REV. F1

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
C1	Capacitor 250 uf 50V	104-0043	Sprague	601D257G050HE4
C2	Capacitor 250 uf 50V	104-0043	Sprague	601D257G050HE4
C3	Capacitor 2200uf 50V	104-0062	Sangamo	057JT222U050B
C4	Capacitor 0.1 uf 100V	103-2004	Erie	8121-100-651-104M
C5	Capacitor 10 uf 60V	104-0067	Sprague	150D106X9060R2
C6	Capacitor 0.1 uf 100V	103-2004	Erie	8121-100-651-104M
C7	Capacitor 250 uf 50V	104-0043	Sprague	601D257G050HE4
C8	Capacitor 10 uf 60V	104-0067	Sprague	150D160X9060R2
C9	Capacitor 0.1 uf 60V	103-2004	Erie	8121-100-651-104M
CR1	Diode Full Wave Bridge	100-0066	Motorola	MDA970-2
CR2	Diode	100-0006	Motorola	IN4002
CR3	Diode	100-0006	Motorola	IN4002
CR4	Diode Zener 36V	100-0113	Motorola	IN5258B
CR5	Diode Zener 30V	100-0111	Motorola	IN5256B
CR6	Diode	100-0006	Motorola	IN4002
CR7	Diode	100-0006	Motorola	IN4002
CR8	Diode	100-0006	Motorola	IN4002
Q1	Transistor	101-0069	Motorola	2N5985
Q2	Transistor	101-0069	Motorola	2N5985

TRS NO: 17021584 ASSEMBLY P/N: 152-0137 SHEET 1 OF 3

ASSEMBLY DESCRIPTION AC TO DC REGULATOR 28 VOLT

REPLACEMENT PART LIST FOR SCHEMATIC 12011584 REV. F1

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
Q3	Transistor	101-0057	National	2N2102
Q4	Transistor	101-0057	National	2N2102
Q5	Transistor	101-0072	Motorola	2N6055
Q6	Transistor	101-0010	I.T.T.	2N2905
R1	Resistor 20K 1W	114-0046	AB	RCR32G203J
R2	Resistor 1 ohm 1/2W	113-01R0	AB	RCR20G1R0J
R3	Resistor 1 ohm 1/2W	113-01R0	AB	RCR20G1R0J
R4	Resistor 1 ohm 1/2W	113-01R0	AB	RCR20G1R0J
R5	Resistor 10K 1/4W 5%	112-0103	AB	RCR07G103J
R6	NOT USED			
R7	Pot 500 ohm Variable	110-0023	Spectrol	43P-501
R8	Resistor 5.6K 1/4W 5%	112-0562	AB	RCR07G562J
R9	Resistor 3.3K 1/4W 5%	112-0332	AB	RCR07G332J
R10	Pot 2K Variable	110-0021	Spectrol	43P-202
R11	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J
R12	Resistor 7.5K 1/4W 5%	112-0752	AB	RCR07G752J
R13	Resistor 7.5K 1/4W 5%	112-0752	AB	RCR07G752J
R14	Resistor 4.7K 1/4W 5%	112-0472	AB	RCR07G472J
R15	Resistor 10K 1/4W 5%	112-0103	AB	RCR07G103J
R16	Resistor 1K 1/4W 5%	112-0102	AB	RCR07G102J

TRS NO: 17021584 ASSEMBLY P/N: 152-0137 SHEET 2 OF 3

ASSEMBLY DESCRIPTION AC TO DC REGULATOR 28 VOLT

REPLACEMENT PART LIST FOR SCHEMATIC 12011584 REV. F1

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
R17	Resistor 300 ohm 1/4W 5%	112-0301	AB	RCR07G301J
R18	Resistor 1.3K 1/4W 5%	112-0132	AB	RCR07G132J
R19	Resistor 22K 1/4W 5%	112-0223	AB	RCR07G223J
R20	NOT USED			
R21	Thermistor 10K 1%	114-0036	BALCO	BALCOT2MAW2F
Z1	IC	102-0022	Motorola	MC1723G

TRS NO: 17021584 ASSEMBLY P/N: 152-0137 SHEET 3 OF 3

ASSEMBLY DESCRIPTION AC TO DC REGULATOR 28 VOLT

REPLACEMENT PART LIST FOR SCHEMATIC 12011584 REV. F1

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
C1	Capacitor 680 uf 50V	104-0046	Sprague	601D687G050JJ4
C2	Capacitor 22 uf 35V	104-0025	Sprague	150D226X9035R2
C3	Capacitor 1 uf 50V	103-0105	Erie	8131-505-651-105M
CR1	Diode	100-0006	Motorola	IN4002
CR2	Diode	100-0006	Motorola	IN4002
CR3	Diode	100-0006	Motorola	IN4002
CR4	Diode	100-0006	Motorola	IN4002
CR5	Diode Zener 30V 5%	100-0111	Motorola	IN5256B
CR6	Diode	100-0006	Motorola	IN4002
F1	Fuse 1/4 Clip	119-0147	Littlefuse	102-068
R1	Resistor 15K 1/2W 5%	113-0153	AB	RCR20G153J
R2	Resistor 15K 1/2W 5%	113-0153	AB	RCR20G153J
R3	Resistor 120K 1W 5%	114-0031	AB	RCR20G124J
R4	Resistor 15K 1/2W 5%	113-0153	AB	RCR20G153J
R5	Resistor 15K 1/2W 5%	113-0153	AB	RCR20G153J
R6	Resistor 4.7K 1W 5%	114-0045	AB	RCR32G472J
R7	Resistor 15K 1/2W 5%	113-0153	AB	RCR20G153J
R8	Resistor 100K 1/4W 5%	112-0104	AB	RCR07G104J

TRS NO: 17021586 ASSEMBLY P/N: 152-0139 SHEET 1 OF 2

ASSEMBLY DESCRIPTION AC TO DC POWER SUPPLY (MOTHERBOARD)

REPLACEMENT PART LIST FOR SCHEMATIC 12011586 REV. A1

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
R9	Resistor 47K 1/4W 5%	112-0473	AB	RCR07G473J
R10	Resistor 47K 1/4W 5%	112-0473	AB	RCR07G473G
R11	Resistor 1.5K 1/2W 5%	113-0152	AB	RCR20G152J
R12	Resistor 130 ohm 1W 5%	114-0037	AB	RCR20G131J
Q1	Transistor	101-0072	Motorola	2N6055
Q2	Transistor	101-0010	Motorola	2N2905
Q3	Transistor	101-0010	Motorola	2N2905
S1	Switch 4P DT	125-0020	Switchcraft	50212L
K1	Relay DPDT	125-0026	P&B	KNP-11D21-24V
CB1	Circuit Breaker	125-0027	Airpax	APG11-1-6-2-152

TRS NO: 17021586 ASSEMBLY P/N: 152-0139 SHEET 2 OF 2

ASSEMBLY DESCRIPTION AC TO DC POWER SUPPLY (MOTHERBOARD)

REPLACEMENT PART LIST FOR SCHEMATIC 12011586 REV. A1

ELECTRICAL RELEASE 15-9/76 MECHANICAL RELEASE

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
	Relay, DPDT	125-0026	P & B	KNP-11D21-24
	Circuit Breaker	125-0027	AIRPAX	APG-11-1-6-2-152
	Fuse 1/2A, Slo-Glo	132-0026	LITTLEFUSE	313.500
	Lamp Lens, Red	132-0001	ELDEMA	RL090RC
	Lamp Lens, Amber	132-0003	ELDEMA	RL090AC
	Lamp bulb	132-0002	CHICAGO MN	C9A
	Regulator 15V AC-DC	152-0136	T/C	12011583
	Regulator 28V AC-DC	152-0137	T/C	12011584
	Regulator 5V AC-DC	152-0135	T/C	12011582
	Extender Board	152-0138	T/C	12011585
	Mother Board AC-DC	152-0139	T/C	12011586
	Transformer Assy	152-0140	T/C	12011587

TRS NO: _____ ASSEMBLY P/N: 130-0087 SHEET 1 OF 1

ASSEMBLY DESCRIPTION AC Power Supply (basic)

REPLACEMENT PART LIST FOR SCHEMATIC 12011586 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9 76

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
	Resistor 820 ohm 1/4W	112-0821	A.B.	RCR076821J
	U-link (black)	119-0032	CAMBION	3771-01-03-10
	U-link (red)	119-0033	CAMBION	3771-01-03-12
	Connector	121-0033	AMPHENOL	UG-657 A/U
	Switch 3PDT	125-0001	C & K	7301
	Meter	131-0010	T/C	16000777
	70 MHz Demod Assy	152-0004	T/C	12011007
	Inv/Non-Inv Amp Assy	152-0007	T/C	12011010
	Phase Equalizer Assy	152-0018	T/C	12011022
	Low Pass Filter (15MHz)	152-0115	T/C	12011032
	70 MHz Limter Assy	152-0201	T/C	12011598

TRS NO: _____ ASSEMBLY P/N: 130-0112 SHEET 1 OF 1

ASSEMBLY DESCRIPTION Transmitter FMR Module

REPLACEMENT PART LIST FOR SCHEMATIC 12011600 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9 76

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
	Adaptor 3 mm to "N"	121-0053	Astrolab	29047
	PNC Bulkhead, Jack	121-0033	Amphenol	UG657 A/U
	Conn. 3 Pin Female	121-0013	Burndy	BT07A8-3S
	Conn. 3 Pin Female	121-0015	Burndy	BT07A8-3SW
	Conn. 4 Pin Female	121-0016	Burndy	BT07A14-195
	Conn. 19 Pin Female	121-0017	Burndy	BT07A14-195
	Conn. 5 Pin Male	121-0107	Bendix	PT07A-14-5P
	Connector	121-0194	Vernitron	BEAU-5330 3AB
	Cable Assy, AC Power	137-0141	T/C	12011690
	Cable Assy, DC Power	137-0142	T/C	12011691
	Fan (DC)	131-0025	Paramotor	8110
	Line Filter	131-0003	Corcom	20B1
	Lamp Socket	120-0011	Eldema	RLA-60B0
	Lense, Red	132-0001	Eldema	RL090 RC
	Lense, Amber	132-0003	Eldema	RL090 AC
	Lamp Bulb	132-0024	GE	327
	Lamp Bulb, Neon	132-0002	GE	NE2J
	Meter (Control Mon)	131-0007	Beede	910559
	Meter (FMR) (AFC)	131-0010	T/C	16000777
	Switch 3 PDT (FMR) (AFC)	125-0001	C&K	7301
	Connector (FMR)	121-0033	Amphenol	UG-657 A/U

TRS NO: _____ ASSEMBLY P/N: 130-0246 SHEET 1 OF 2

ASSEMBLY DESCRIPTION TCM-6 TRANSMITTER ENCLOSURE

REPLACEMENT PART LIST FOR SCHEMATIC 12011640 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9-76

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
	Switch, Rotary (B-Band)	125-0037	Centralab	PA160 Series
	Fuse 1/2 A Slo-Blo	132-0026	Littlefuse	313.500
	Switch, 2 Pole, 12 Pos	125-0004	Oak	399-421-K
	Switch SPDT	125-0005	C&K	7101
	Switch, Toggle 3 PDT	125-0001	C&K	7301

TRS NO: _____ ASSEMBLY P/N: 130-0246 SHEET 2 OF 2

ASSEMBLY DESCRIPTION TCM-6 TRANSMITTER ENCLOSURE

REPLACEMENT PART LIST FOR SCHEMATIC 12011640 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9/76

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
	Lamp Socket	120-0011	ELDEMA	RLA-60B0
	Lens, Red	132-0001	ELDEMA	RL090 RC
	Bulb #327	132-0024	GE	327
	70 MHz Filter Amp	152-0092	T/C	12011533
	Interface Lamp Driver	152-0132	T/C	12011596
	Dev. Control Board	152-0184	T/C	12011681
	VCO Driver	152-0187	T/C	12011682
	L.O. Power Amp & Mult	152-0014	T/C	12011017

TRS NO: _____ ASSEMBLY P/N: _____ SHEET 1 OF 1

ASSEMBLY DESCRIPTION RF Module, XMTR

REPLACEMENT PART LIST FOR SCHEMATIC 12011642 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9 76

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
	Socket, Lamp	120-0011	Eldema	RLA-6080
	Meter	131-0007	Beede	910559
	Lens, Red	132-0001	Eldema	RL090RC
	Lamp, 28V	132-0024	GE	327
	Audio Attenuator	130-0001	T/C	12011042
	Video Attenuator	130-0020	T/C	12011046
	P.C. Assy. TX	152-0182	T/C	12011653
	Remote Fail Relay Assy	152-0308	T/C	12010211
	T.T. Generator Assy	152-0093	T/C	12011534
	Message Amplifier Assy	152-0206	T/C	12010044
	Video Sync Det. Assy	152-0167	T/C	12011630

TRS NO: _____ ASSEMBLY P/N: 130-0107 SHEET 1 OF 1

ASSEMBLY DESCRIPTION Transmitter Control Monitor Module

REPLACEMENT PART LIST FOR SCHEMATIC 12011643 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9-76

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
	U-Link (black)	119-0032	Cambion	3771-01-03-10
	U-Link (red)	119-0033	Cambion	3771-01-03-12
	Switch, Rotary	125-0037	Centralab	PA160
	INV/Non-INV Amp.	152-0007	T/C	12011010
	Strap Attenuator	152-0124	T/C	12011573
	Summing Network	152-0193	T/C	12011692
	Var Amp Equal (option)	152-0048	T/C	12011054
	Pre-Emphasis Message	See Table 1	T/C	12011023
	Pre-Emphasis TV	See Table 1	T/C	12011024
	Low Pass Filter/V.E. Filter	See Table 1	T/C	12011032
	Subcarrier Modulator (Narrow)	See Table 2	T/C	12011058
	Dual Notch Filter	See Table 2	T/C	12010137
	C-Pilot Oscillator (optional)	See Table 3	T/C	12011616
	Notch Filter	See Table 2	T/C	12011033
	Subcarrier B.P. Filter	See Table 2	T/C	12011040
	Subcarrier Mod. (Wideband)	See Table	T/C	12011053

TRS NO: _____ ASSEMBLY P/N: _____ SHEET 1 OF 2

ASSEMBLY DESCRIPTION XMTR BASEBAND MODULE

REPLACEMENT PART LIST FOR SCHEMATIC 12011644 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9/76

TERRACOM

BASEBAND FILTERS FOR PRE - DE-EMPHASIS

(IN RECOMMENDED ORDER OF USE)

TABLE 1

TV LINES	PRE-EMPHASIS	DE-EMPHASIS	BUTTERWORTH LOW PASS FILTER		ELLIPTICAL LOW PASS FILTER	
405			6 MHz	152-0038	3.9 MHz	152-0127
525	152-0023	152-0030	6 MHz	152-0038	4.5 MHz	152-0054
625	152-0024	152-0031	8 MHz	152-0050	5.8 MHz	152-0133
819	152-0025	152-0032	10 MHz	152-0051		
1025			12 MHz	152-0237		

MESSAGE CHANNELS	PRE-EMPHASIS	DE-EMPHASIS	BUTTERWORTH LOW PASS FILTER		ELLIPTICAL LOW PASS FILTER	
24			150 KHz			
60			360 KHz			
120			800 KHz	152-0452		
300	152-0019	152-0026	2 MHz	152-0239		
600	152-0020	152-0027	4.2 MHz	152-0454		
960	152-0021	152-0028	6 MHz	152-0038	3.9 MHz	152-0127
1200	152-0022	152-0029	8 MHz	152-0050	5.8 MHz	152-0133
1800	152-0203	152-0204	12 MHz	152-0237		
2400	152-0337	152-0338	15 MHz	152-0115		
OTHER FILTER PC BOARD ASSY'S			5 MHz	152-0240	4.3 MHz	152-0070
			25 MHz	152-0353	5.8 MHz	152-0403
			250 KHz	152-0238	(625 Line Plus Data)	
			300 KHz	152-0236		
			500 KHz	152-0363		
			2.2 MHz	152-0453		
			Special	152-0049		

SUBCARRIER PC BOARDS

TABLE 2

FREQUENCY (MHz)	SUBCARRIER MODULATOR	SUBCARRIER DEMODULATOR 100 KHz	SUBCARRIER DEMODULATOR 200 KHz	SUBCARRIER BAND PASS FILTER	NOTCH FILTER	DUAL NOTCH FILTER
2.0		152-0559		152-0220		
4.8	152-0101	152-0560		152-0081	152-0086	
5.8	152-0102	152-0561	152-0572	152-0080	152-0085	5.8-6.8 152-0284
6.5	152-0103	152-0562	152-0573	152-0079	152-0084	
6.8	152-0091	152-0563	152-0574	152-0078	152-0076	5.8 & 6.8 152-0284
7.5	152-0062	152-0564	152-0575	152-0044	152-0039	7.5 & 8.5 152-0285
8.5	152-0090	152-0566	152-0577	152-0077	152-0074	7.5-8.5 152-0285
9.5	152-0104	152-0567	152-0578	152-0097	152-0098	
12.0	152-0105	152-0570		152-0058	152-0088	
14.0	152-0106	152-0571		152-0083	152-0089	
Special (Non Stand.)	152-0266	152-0553		152-0267	152-0268	152-0283

TABLE 3 C-PILOT PC BOARD ASSEMBLIES

FREQUENCY (MHz)	C-PILOT OSCILLATOR	C-PIOLT DETECTOR
3.2	152-0164	152-0165
8.5	152-0162	152-0163
9.023	152-0160	152-0161
11.25	152-0417	152-0415
17.0	152-0190	152-0191
Customer Spec.	152-0349	152-0350
10.75	152-0416	152-0414

TABLE 4 70 MHz IF BANDPASS FILTERS

70 MHz ±3 dB at	SUB-MODULE PART NO.	
±2.5 MHz Loss -3.0 dB	130-0130	152-0202
±5.0 MHz Loss 0 dB	130-0069	152-0036
±10.0 MHz Loss +0.5 dB	130-0210	152-0270
±15.0 MHz Loss 0 dB	130-0024	152-0008
±20.0 MHz Loss +3.0 dB	130-0192	152-0227
±6.0 MHz Loss -1.5 dB	130-0250	152-0346
±12.5 MHz Loss	130-0323	152-0413
±8.75 MHz Loss	130-0309	152-0359

TRS NO: _____ ASSEMBLY P/N: _____ SHEET 2 OF 2

ASSEMBLY DESCRIPTION XMTR Baseband Module

REPLACEMENT PART LIST FOR SCHEMATIC 12011644 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9/76

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
	U-link (black)	119-0032	Cambion	3771-01-03-10
	U-link (red)	119-0033	Cambion	3771-01-03-12
	Socket, lamp	120-0011	Eldema	RLA-60 0
	Lens, Red	132-0001	Eldema	RL090RC
	Lamp, 28V	132-0024	GE	327
	Xtal Osc. P.C. Assy	152-0012	T/C	12011015
	Lamp Driver P.C. Assy.	152-0042	T/C	12011039
	Crystal Storage P.C. Bd.	152-0047	T/C	12011045

TRS NO: _____ ASSEMBLY P/N: 130-0207 SHEET 1 OF 1

ASSEMBLY DESCRIPTION Transmitter Synth-Module

REPLACEMENT PART LIST FOR SCHEMATIC 12011645 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9 76

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
	U-Link (black)	119-0032	Cambion	3771-01-03-10
	U-Link (red)	119-0033	Cambion	3771-01-01-12
	Resistor 100 ohm 1/4 W	112-0101	AB	RCR076101J
	Socket, Lamp	120-0011	Eldema	RLA60BO
	Switch 3PDT	125-0001	C & K	7301
	Meter	131-0010	T/C	16000777
	Lens, Red	132-0001	Eldema	RL090RL
	Lamp, 28V	132-0024	G.E.	327
	XMTR IF & Demod Assy	152-0005	T/C	12011008
	AFC P-1 Assy	152-0010	T/C	12011014
	B.B. Amplifier P.C. Assy	152-0001	T/C	12011001
	B.B. Pre-Amplifier P.C. Assy	152-0043	T/C	12011039

TRS NO: _____ ASSEMBLY P/N: 130-0205 SHEET 1 OF 1

ASSEMBLY DESCRIPTION TRANSMITTER AFC

REPLACEMENT PART LIST FOR SCHEMATIC 12011646 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9/76

TERRACOM

Ref. Desig.	Description	TerraCom Part No.	Manuf.	Manufacturer Part No.
	U-link (black	119-0032	Cambion	3771-01-03-10
	U-link (red)	119-0033	Cambion	3771-01-01-12
	U-link (blue)	119-0022	Cambion	3771-01-03-16
	Lamp Socket	120-0011	Eldema	RLA-6080
	Lens, Red, Lamp	132-0001	Eldema	RL090RC
	Lamp, 28V	132-0024	GE	327
	VCO Assy	152-0305	T/C	12010166
	Sample & hold Assy	152-0302	T/C	12010173
	Sample & hold Assy	152-0211	T/C	12010040
	Sample & hold Assy	152-0212	T/C	12010042

TRS NO: _____ ASSEMBLY P/N: 130-0135 SHEET 1 OF 1

ASSEMBLY DESCRIPTION TX Digital Freq. Synth

REPLACEMENT PART LIST FOR SCHEMATIC 12011647 REV. _____

ELECTRICAL RELEASE _____ MECHANICAL RELEASE _____

15-9 76

TERRACOM

SECTION 7

SCHEMATICS AND DRAWINGS

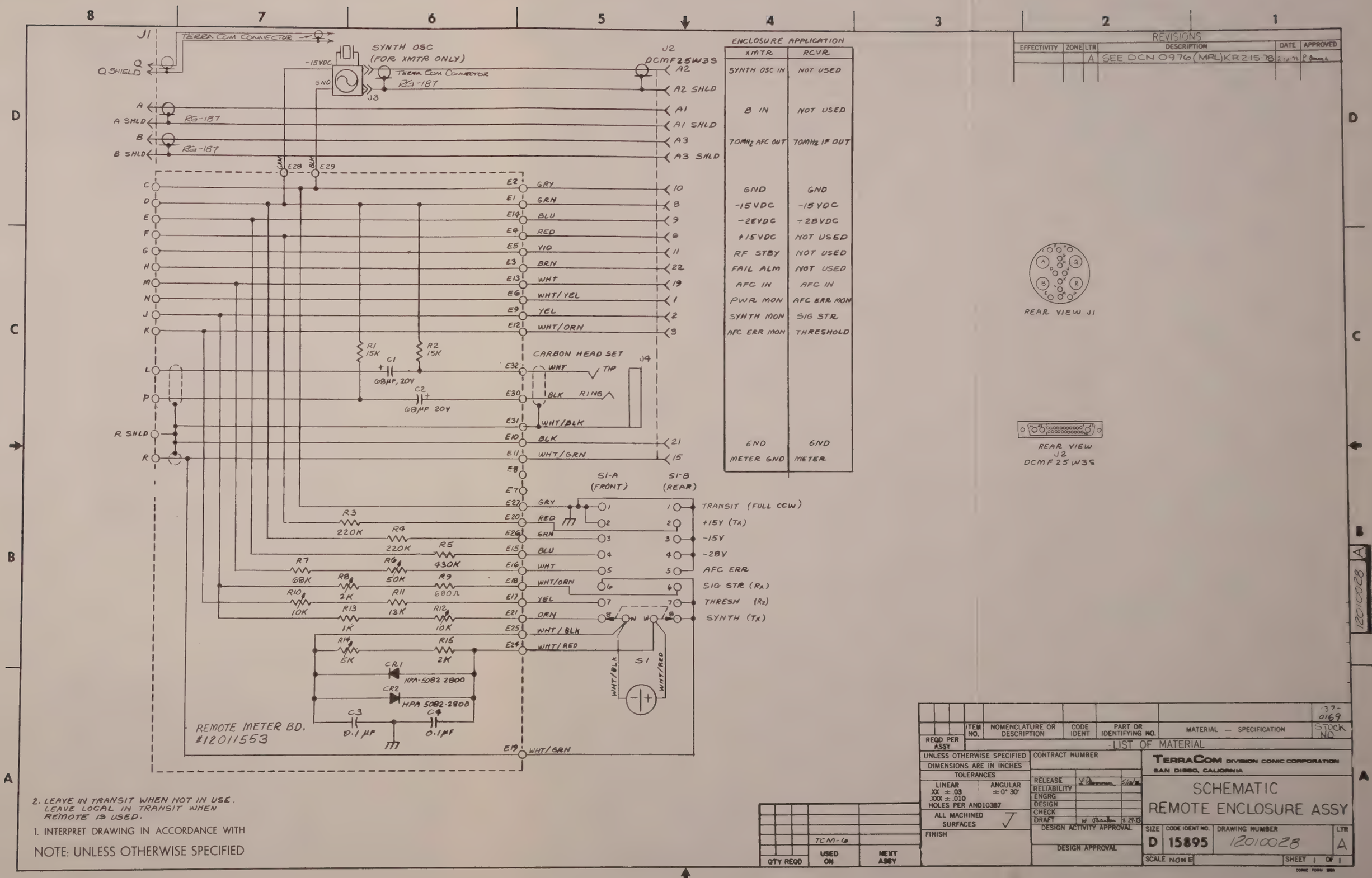
7.1 GENERAL INFORMATION

Wiring diagrams for all standard and optional modules used in the TCM-6 Transmitter are arranged in this section according to module number. Schematics for the individual PC boards used in the AC and DC power supplies are also included in this section, preceding their respective module wiring diagrams. All other PC board schematics can be found in the TCM-6 Maintenance Manual.

7.2 INDEX

Dwg. Number	Description
12010028	Remote Enclosure Assembly
12010029	Remote Cable Assembly
12010030	Remote RF Head Patch Cord
12010046	Baseband Module W/Repeater & C-Pilot
12010087	Baseband Module W/Repeater & Two Subcarriers
12010186	DC-DC Regulator +5V
12010187	DC-DC Regulator +15V
12010189	DC-DC Regulator -28V
12010190	DC Power Supply
12010787	Baseband Module W/Biternary Subcarrier
12010984	Data Module NRZ Input
12011582	AC-DC Regulator +5V
12011583	AC-DC Regulator +15V
12011584	AC-DC Regulator -28V
12011586	AC Power Supply
12011600	FMR Module
12011640	Wiring Harness - TX Web Assembly
12011642	RF Module

Dwg. Number	Description
12011643	Control Monitor Module
12011644	Baseband Module W/C-Pilot
12011645	XTAL Synthesizer Module
12011647	Digital Synthesizer Module
12011648	Baseband Module W/Aux Input
12013060	Data Module B6ZS/AMI Input
12014474	AFC Module
12014608	Wiring Harness-TX Web Assy W/Wideband Modulator in Digital Synthesizer Module.
12014609	Baseband Module W/C-Pilot & External (3rd) Subcarrier.
12014611	Digital Synthesizer Module W/Wideband Subcarrier



ENCLOSURE APPLICATION

XMTR	RCVR
SYNTH OSC IN	NOT USED
B IN	NOT USED
70MHz AFC OUT	70MHz IF OUT
GND	GND
-15VDC	-15VDC
-28VDC	+28VDC
+15VDC	NOT USED
RF STBY	NOT USED
FAIL ALM	NOT USED
AFC IN	AFC IN
PWR MON	AFC ERR MON
SYNTH MON	SIG STR
AFC ERR MON	THRESHOLD
GND	GND
METER GND	METER

REVISIONS

EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	SEE DCN 0976 (MRL) KR 2-15-78	2-16-78	[illegible]

2. LEAVE IN TRANSIT WHEN NOT IN USE. LEAVE LOCAL IN TRANSIT WHEN REMOTE IS USED.

1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY
	TCM-6	

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	STOCK NO.
						137-0169

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER
RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC
REMOTE ENCLOSURE ASSY

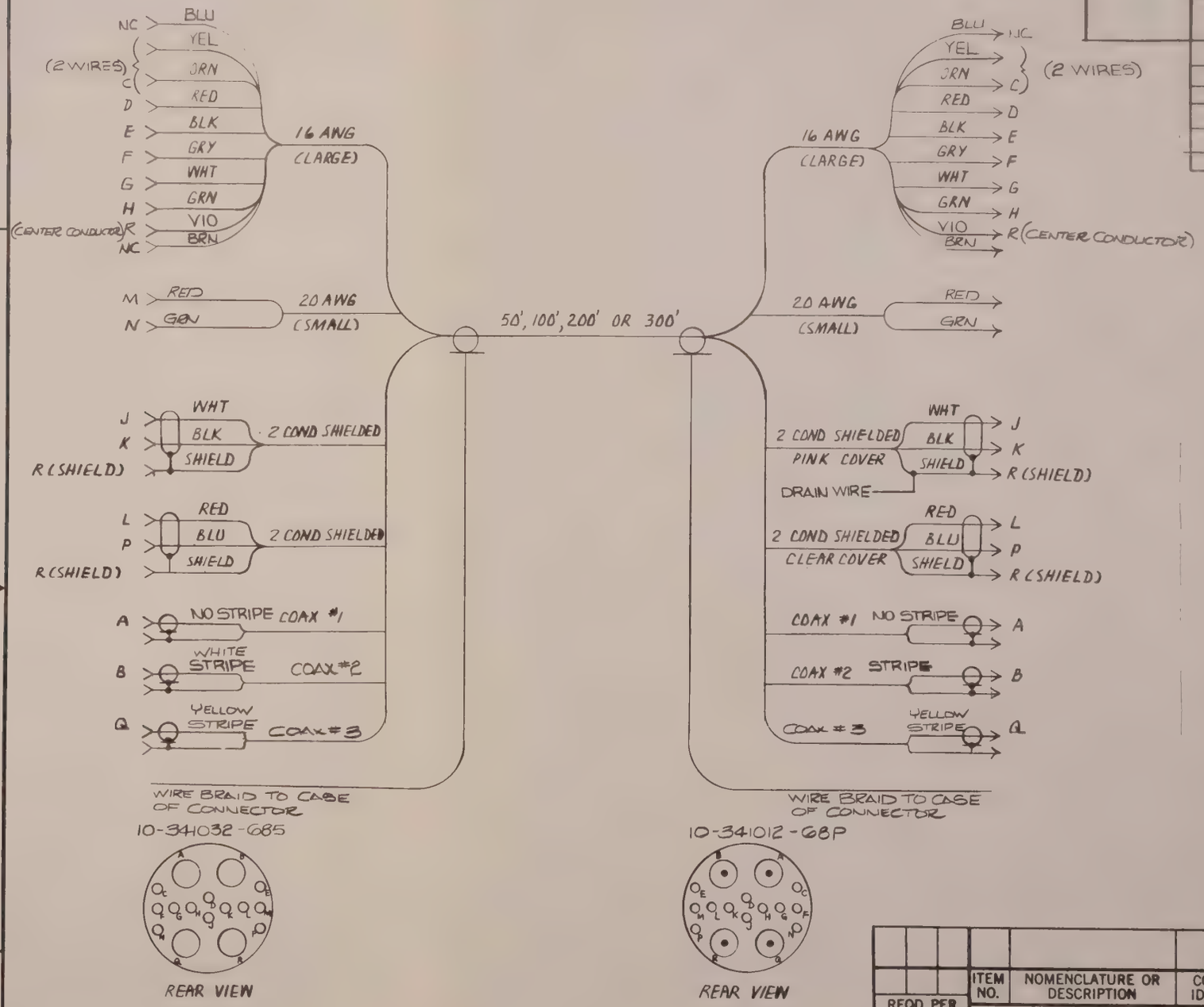
SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12010028	A

SCALE NONE
SHEET 1 OF 1

12010028 A

REVISIONS

EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	ADDED "137-0357" TO TABLE PER DCN 0455 WBC	3/3/77	JRB
		A-1	SEE DCN'S 0879, 0880, 0881, 0882. (MRL) KR 2-20-78	2/20/78	[illegible]
		A-2	SEE DCN #1201 THRU #1204 KR. 3-16-78	3-16-78	[illegible]
		A-3	SEE DCN #1546 & 1549 (MRL) KR 7-25-78	7-26-78	[illegible]
		A-4	SEE DCN 2438 MRL ONLY DM 2-[illegible]-80	[illegible]	[illegible]
		B	SEE DCN 2689 ALM 5-13-80	5/13/80	[illegible]
		C	SEE DCN 4018 MF 12-29-80	1/7/81	T. Schmid
		F	SEE DCN 4673, 4737, 4788 DW 9-13-81	10/6/81	D. [illegible]



REMOTE CABLES

LENGTH	STANDARD	W/WALL FEED	W/90°
25'	137-0357	137-0508	137-0507
50'	137-0406		
75'			
100'	137-0407		137-0572
125'			
150'			
175'			
200'	137-0408		
225'			
250'			
275'			
300'	137-0409		
163.5'	137-0564		

1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY
	TCM-6	

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	See table STOCK NO.

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	L. [illegible]	6/30/76
RELIABILITY		
ENGRG		
DESIGN		
CHECK		
DRAFT	H. Barker	9-5-72

DESIGN ACTIVITY APPROVAL

DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

REMOTE CABLE ASSY

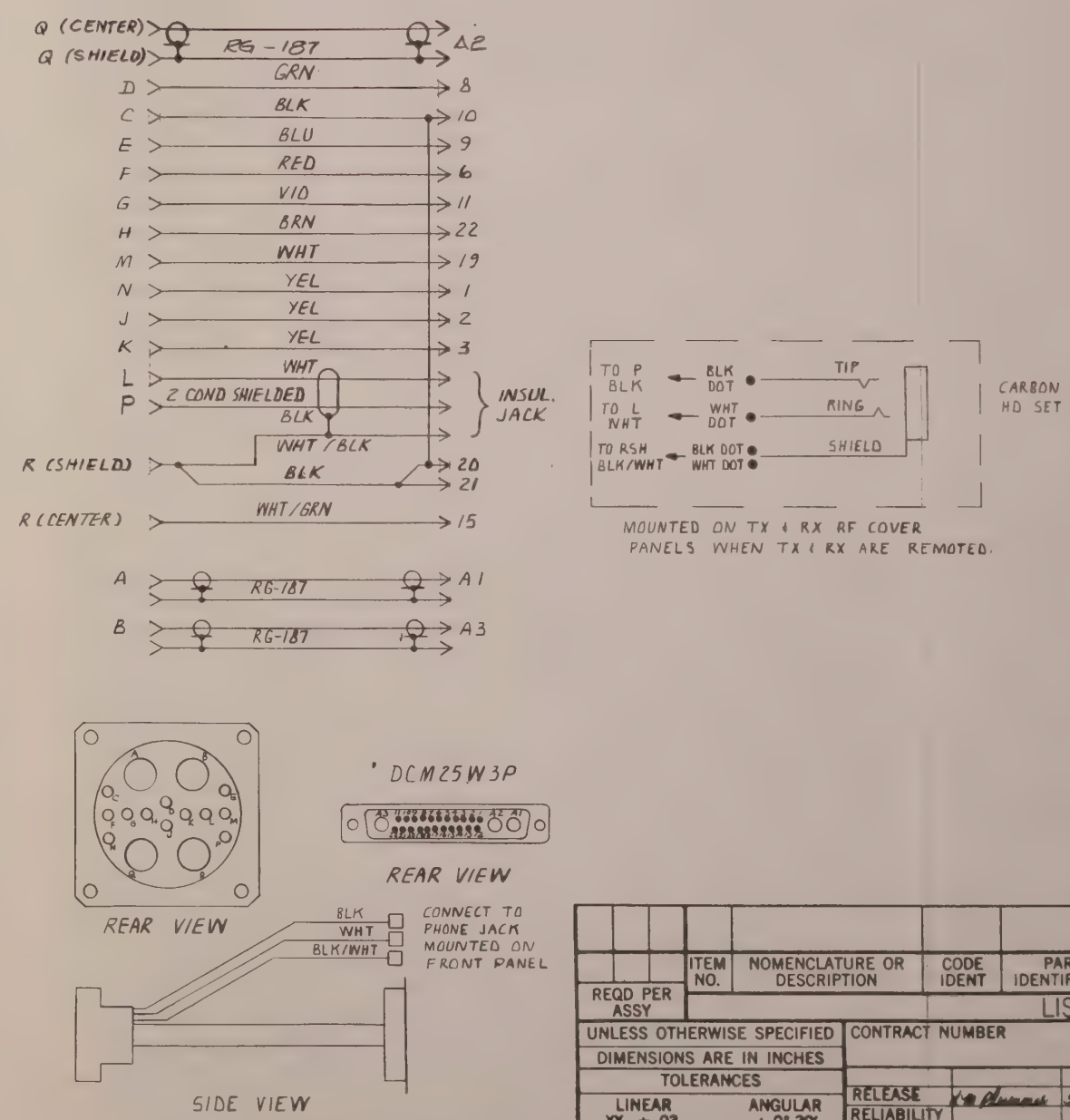
SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12010029	F

SCALE NONE SHEET 1 OF 1

CONIC FORM 159A

12010029 F

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	ADDED JUMPER BETWEEN PINS 10 AND 20	4-3-75	
		B	SEE DCN 0382. JK 1-10-76		[illegible] 1/23/76
		B-1	SEE DCN 2551 (MRL ONLY) DM 3-3-80	3-27-80	[illegible]



REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	STOCK NO.
						137-0168

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	[illegible]	5/13/[illegible]
RELIABILITY		
ENGRG		
DESIGN		
CHECK		
DRAFT	[illegible]	9-5-73

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

REMOTE RF HEAD PATCH CORD

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12010030	B-1

SCALE NONE
SHEET 1 OF 1

QTY REQD	USED ON	NEXT ASSY
	TCM-6	

1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

12010030 B-1

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	REVERSED POS. OF LOW PASS FILTER AND STRAP ATTENUATOR BDS. ADDED WHT/YEL WIRE BETWEEN P1-4 AND E11 ON SUB-CARR MOD. SEE DCNS 0217 AND 0218	9-2-75	
		B	SEE DCN 0460 WBC	2-17-77	JRB
		C	SEE DCN 0574 WBC	6-7-77	JRB
		D	SEE DCN 2941 DB 9-1-80	9/11/80	DB
		D1	SEE DCN 4124 B.C. 1-27-81	1/30/81	DWB

B8 STRAP ATTENUATOR 12011573

B6 SUMMING NETWORK 12011692

B7 PRE-EMPHASIS (OPT) 12011023 OR 12011024

B5 BY-PASS BOARD 12011603 (STANDARD) OR VARIABLE AMPLITUDE EQUALIZER 12011054 (OPT)

SIDE 1

SIDE 2

B3 C-PILOT OSC (OPT) 12011616

(DCM-25W3-P) P1

AUD CH 1 CARR
AUD CH 1 IN
AUD CH 1 IN
TEST TONE IN
GND
C-PILOT MON
+15VDC
GND
SVCE CH IN
-15 VDC
GND
-28VDC
GND
GND
GND

B9 ⚠2 LOW PASS ELLIPTICAL 12011032 OR LOW PASS BUTTERWORTH

B1 INV-MON-INV AMP 12011010

B2 SUBCARR MOD(OPT) 12011058

B4 ⚠7 MODIFIED STRAP ATTENUATOR 12011573 MODIFIED

152-0160 XTAL

S1-A S1-B S1-C S1-D

B BAND (XMTR) TT SEL/REP AUD1 AUD2 BB REP

SIDE 2

FRONT PANEL

S1 FROM REAR

S-1B (REAR) S-1C (FRONT) S-1A (REAR) S-1D (FRONT)

JUMPER WIRE TABLE

LENGTH	FROM	TO
6.0"	B5E7 WHT	B1E1
	B5E8 BLK	B1E21

COAX CABLE TABLE

LENGTH	FROM	TO
18.5"	B2 E5 E6	B6 E5 E4
15.5"	B3 E3 E4	B6 E2 E3

DM53741-5001 — RG187/U — LENGTH — TCM121-0055

FROM P1A3 6.5" TO B1 E15 E14

U LINK	FROM	TO
RED 119-0033 (0.4")	B6 E1	B7 E4
	B7 E1	B8 E11
	B8 E1	B9 E2
BLACK 119-0032 (0.4")	B6 E14	B7 E5
	B7 E10	B8 E12
	B8 E20	B9 E3
BLUE 119-0022 (0.4")	B5 E2	B5 E14
	B7 E2	B7 E9
	B7 E3	B7 E6
	B5 E13	B5 E15
	B6 E17	B6 E18
	B1 E8	B1 E9
	B1 E6	B1 E7
BLUE 119-0110 (0.2")	B2 E22	B2 E23 (OPTIONAL)
	B2 E26	B2 E27 (OPTIONAL)
	B7	6 PLCS
	B4	6 PLCS

⚠1 FOR VIDEO SYSTEM USE PART NO. 152-0686
FOR MESSAGE SYSTEM USE PART NO. 152-0687

⚠6 CONNECTORS ON JUMPER WIRES ARE MADE FROM FEED-THRU TERMINAL SELECTRO 011-1004-00-0-479, AND 1/8" DIA HEAT SHRINK TUBE .6" LONG.

⚠5 STRAP E18 TO E19 ON B1, AND E19 TO E20 ON B6.

4. WIRES FROM P1 12, 13, AND 14 ARE SHIELDED TWISTED PAIRS P.N. 1100-66F.

3. WIRES ARE 22 AWG TEFLON WITH CONNECTOR ON ENDS MADE FROM TEFLON SOCKETS CAMBION 450-4352-01-03-19 AND 1/8" DIA HEAT SHRINK TUBE 0.6" LONG.

⚠2 ELLIPTICAL FILTER SHOWN, BUTTERWORTH FILTER OCCUPIES ONLY HALF OF WIDTH.

1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	STOCK NO.
REQD PER ASSY	LIST OF MATERIAL				

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER ANSI B97
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	J. Cox	2-11-75
RELIABILITY		
ENGRG		
DESIGN		
CHECK		
DRAFT	J. Wilkins	2-5-75

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

WIRING DIAGRAM
BSBD MODULE - XMTR W TT REPEATER & C-PILOT OPTION

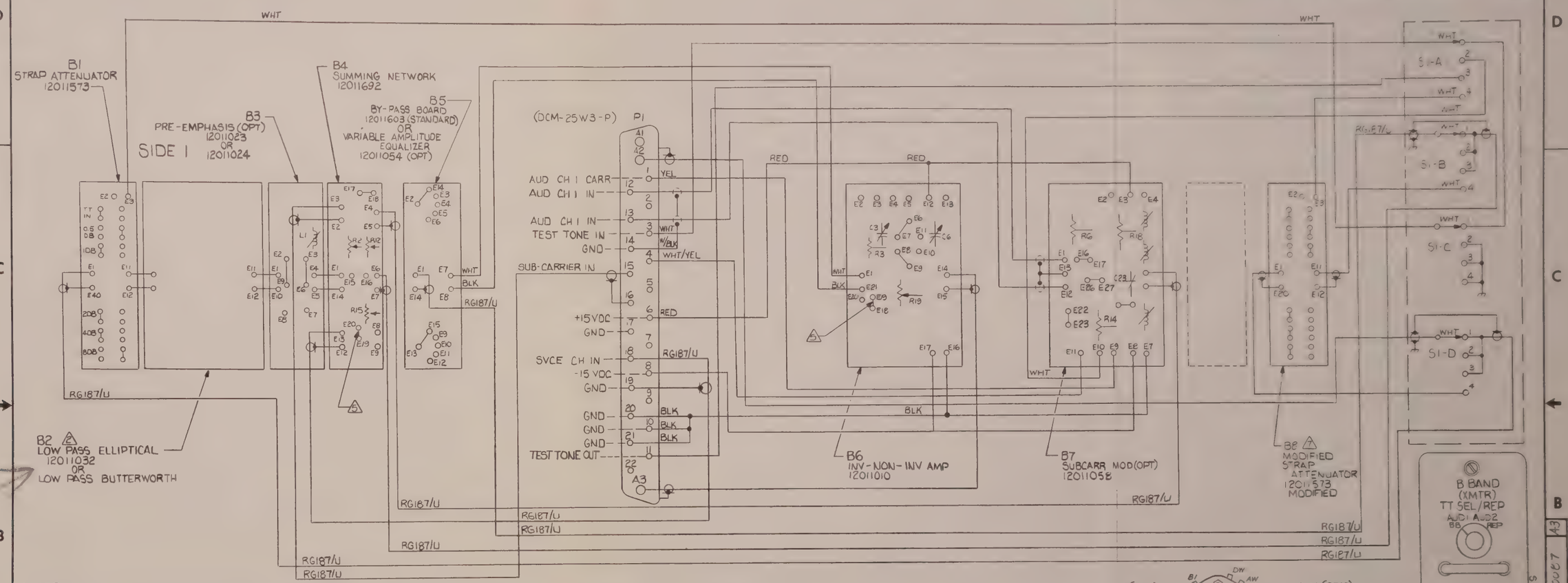
SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12010046	D1

SCALE NONE SHEET 1 OF 1

37-2383

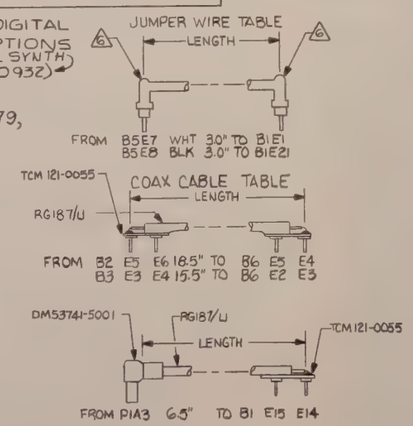
12010046

EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	SEE DCN 0547 WC	[illegible]	[illegible]
		A1	DCN 0715 K.R. 12-8-77	[illegible]	[illegible]
		A2	SEE DCN 1335 KR 5-11-78	[illegible]	[illegible]
		A-3	SEE DCN 2648 ALM 5-21-80	[illegible]	[illegible]



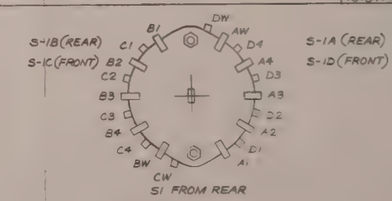
8. USE IN CONJUNCTION WITH WIRING DIAGRAM - DIGITAL FREQ. SYNTH XMTR MODULES WITH SUBCARRIER OPTIONS 12010084 AND XMTR WEB ASSY W/ SUBCARRIER & DIGITAL SYNTH (12010932)
7. MODIFIED BOARD 12011573 MUST BE USED ON B4.
6. CONNECTORS ON JUMPER WIRES ARE MADE FROM FEED-THRU TERMINAL SELECTRO 011-1004-00-0-479, AND 1/8" DIA HEAT SHRINK TUBE .6" LONG.
5. STRAP E18 TO E19 ON B6, AND E19 TO E20 ON B4.
4. WIRES FROM P1 12, 13, AND 14 ARE SHIELDED TWISTED PAIRS P.N. 1100-66F.
3. WIRES ARE 22 AWG TEFLON WITH CONNECTOR ON ENDS MADE FROM TEFLON SOCKETS CAMBION 450-4352-01-03-19 AND 1/8" DIA HEAT SHRINK TUBE 0.6" LONG.
2. ELLIPTICAL FILTER SHOWN, BUTTERWORTH FILTER OCCUPIES ONLY HALF OF WIDTH.
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED



U LINK	FROM	TO
RED 119-0033 (0.4")	B6E1 B7E1 B8E1	B7E4 B8E11 B9E2
BLACK 119-0032 (0.4")	B6E14 B7E10 B8E20	B7E5 B8E12 B9E3
BLUE 119-0022 (0.4")	B5E2 B7E2 B7E3 B5E13 B6E17 B1E8 B1E6	B5E14 B7E9 B7E6 B5E15 B6E18 B1E9 B1E7
BLUE 119-0110 (0.2")	B2E22 B2E26 B7 B4	B2E23 * B2E27 * 6PLCS 6PLCS

* OPTIONAL



QTY REQD	USED ON	NEXT ASSY

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .01 .XXX ± .005 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER
RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK AL GARCIA
DRAFT JRS-BOARD
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

WIRING DIAGRAM: BSBD MODULE W/REPEATER AND TWO SUBCARRIERS

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12010087	A-3

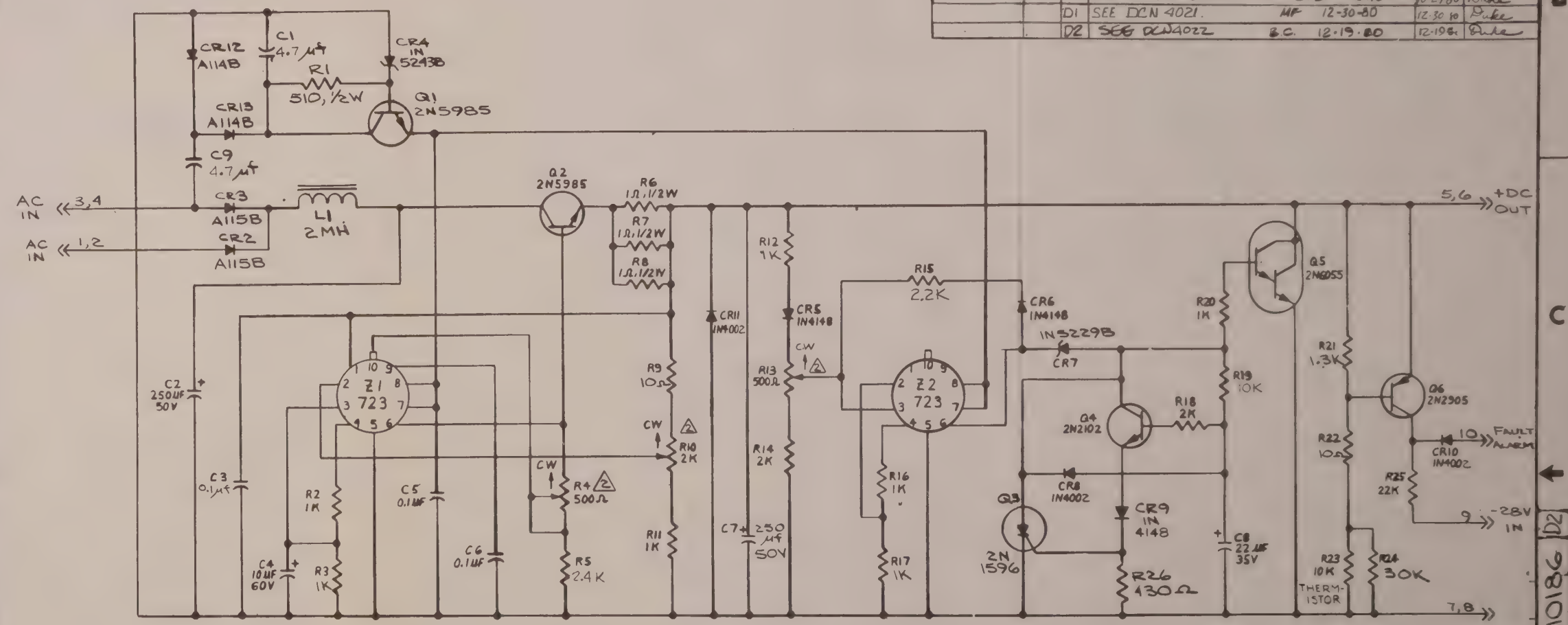
SCALE — SHEET 1 OF 1

CONIC FORM 1004

PROPRIETARY RIGHTS
are involved in the subject matter of this material and all manufacturing, reproduction, use and sales rights pertaining to such matter are expressly reserved. It is submitted in confidence for a specified purpose, and the recipient, by accepting this material, agrees that this material will not be used, copied or reproduced in whole or in part, nor its contents revealed in any manner, or to any person, except for the purposes delivered.

REVISIONS

EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	DCN 0450 RH	1/26/77	RH 1/26/77
		C1	SEE DCN #1531 (MRL) KR 7-19-78	7/20/78	[illegible]
		C2	SEE DCN 2727 ALM 6-2-80	6-4-80	J.E.K.
		C-3	SEE DCN 2771 D.B. 6-27-80	7/7/80	[illegible]
		D	SEE DCN 3023 D.B. 10/27/80	10-29-80	Duke
		D1	SEE DCN 4021. MF 12-30-80	12-30-80	Duke
		D2	SEE DCN 4022 B.C. 12-19-80	12-19-80	Duke



12010186 D2

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .01 .XXX ± .005 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	[illegible]	9/10/76
RELIABILITY		
ENGRG		
DESIGN		
CHECK	RH	8/30/76
DRAFT	[illegible]	8/30/76

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC, 5VDC POWER SUPPLY REGULATOR BOARD

SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO.	LTR
C	15895	12010186	152-0314	D-2

SCALE 2/1 SHEET 1 OF 1

QTY REQD	USED ON	NEXT ASSY

3. CR1 NOT USED
2 TURN CW TO INCREASE
1. ALL RESISTORS 1/4W, 5%,

NOTE: UNLESS OTHERWISE SPECIFIED

CONIC FORM 197A

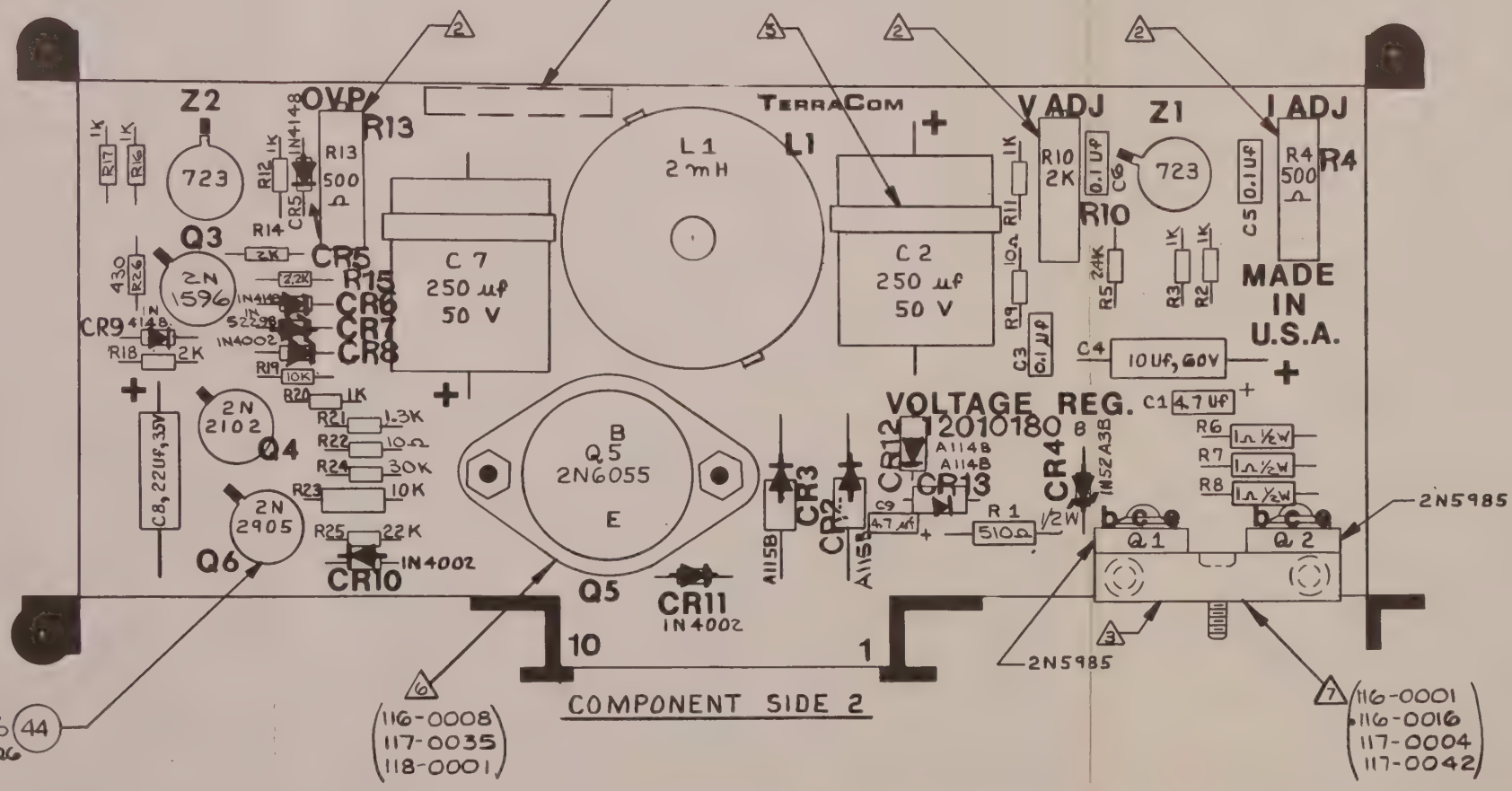
PROPRIETARY RIGHTS

are involved in the subject matter of this material and all manufacturing, reproduction, use and sales rights pertaining to such matter are expressly reserved. It is submitted in confidence for a specified purpose, and the recipient, by accepting this material, agrees that this material will not be used, copied or reproduced in whole or in part, nor its contents revealed in any manner, or to any person, except for the purposes delivered.

REVISIONS

EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	DCN 0450	7/20/77	
		B	L1 CHANGED TO SHIELDED TYPE DCN 0579	7/12/77	DJ. 7/12/77
		B-1	SEE DCN 0791 KR. 2-2-78	2.7.78	DJ
		C	SEE DCN 0798 K.R. 2-7-78	2.7.78	DJ.
		C-1	SEE DCN 1531 (MRL) KR 7-19-78	7.20.78	Lanaya

RUBBER STAMP DWG No. & TITLE APPROX AS SHOWN



△7 USED TO INSTALL HEATSINK AND TRAN.

△6 USED ON Q5 ASSEMBLY.

△5 CABLE TIES ARE 119-0160 (2 REQ'D)

4. ALL RESISTORS ARE 1/4 W, 5%, VALUES IN OHMS

△3 HEATSINK PART No. 145-0154

△2 TURN CW TO INCREASE

1. P.C. BD. No. 12010180 (153-0208)

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	REQD PER ASSY

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .010 .XXX ± .005 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	K Jarman	8/31/76
RELIABILITY		
ENGRG		
DESIGN		
CHECK	KH	8/31/76
DRAFT	T. Wilson	6-17-76

DESIGN ACTIVITY APPROVAL

DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

ASSEMBLY 5V DC POWER SUPPLY— VOLTAGE REGULATOR BD.

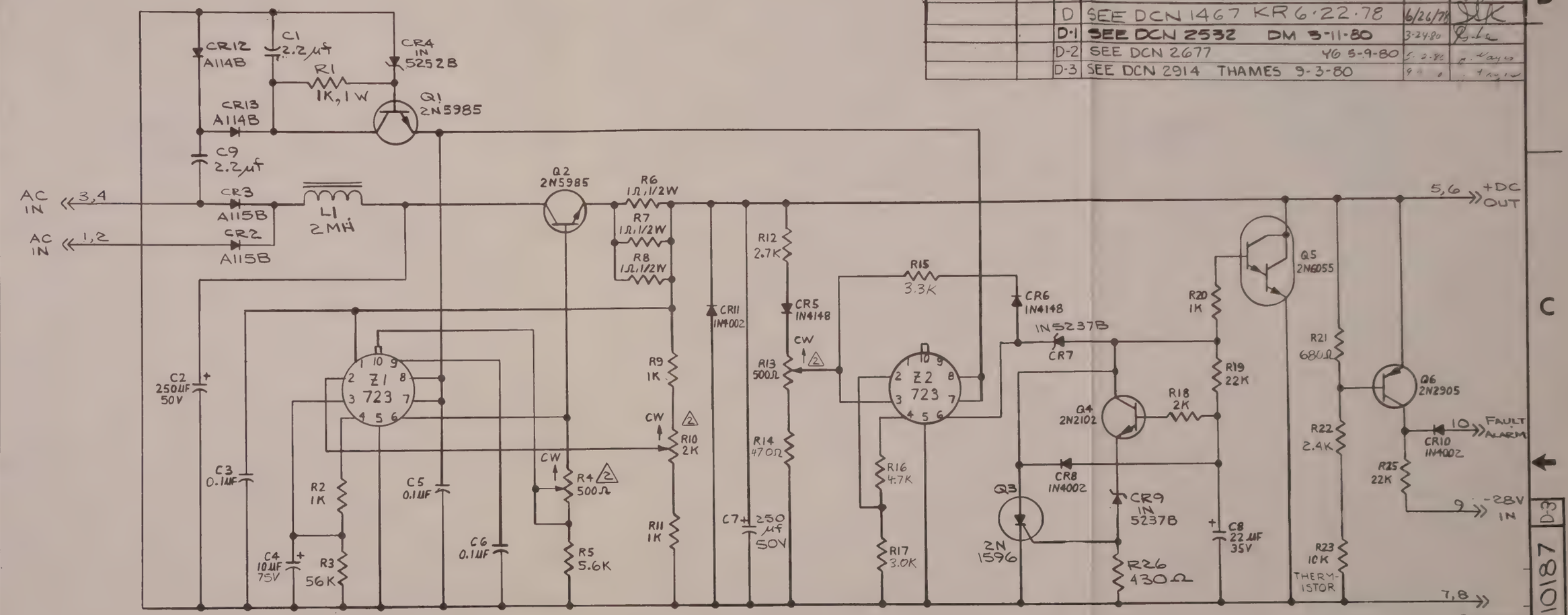
SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO.	LTR
C	15895	12010186	152-0314	D-2

SCALE 2/1 SHEET 1 OF 1

CONIC FORM 197A

12010186 D-2

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	L1 CHANGED TO SHIELDED TYPE R15 WAS 2.7K, R14 WAS 2K, R16 WAS 1K, R17 WAS 10K PER DCN 0578	7/12/77	P.I 7/12/77
		A-1	SEE DCN 0794 KR 2-2-78	2-7-78	P.L.
		C	SEE DCN 0798 KR. 2-7-78	2-7-78	P.L.
		D	SEE DCN 1467 KR 6-22-78	6/26/78	
		D-1	SEE DCN 2532 DM 3-11-80	3-24-80	
		D-2	SEE DCN 2677 YG 5-9-80		
		D-3	SEE DCN 2914 THAMES 9-3-80		



3. CR1 NOT USED

2 TURN CW TO INCREASE

1. ALL RESISTORS ¼W, 5%,

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	REQD PER ASSY

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .01 .XXX ± .005 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	J. Thompson	1/26/77
RELIABILITY		
ENGRG		
DESIGN		
CHECK	R.H.	1/26/77
DRAFT	K. Rogers	1/26/77

DESIGN ACTIVITY APPROVAL

DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC, 15VDC POWER SUPPLY REGULATOR BOARD

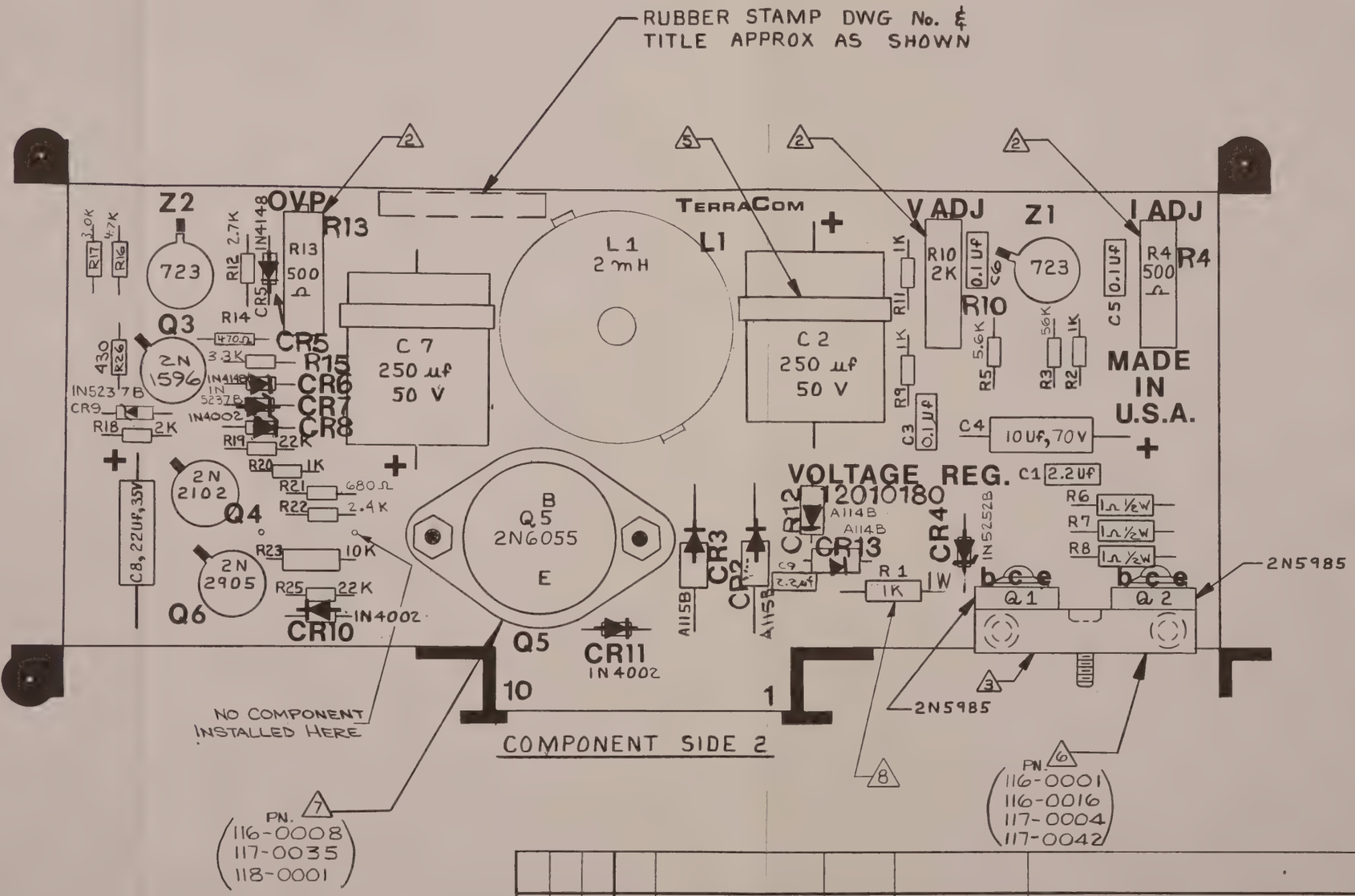
SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO.	LTR
C	15895	12010187	152-0315	D-3

SCALE 2/1 SHEET 1 OF 1

12010187 D3

CONIC FORM 197A

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED



8. 1W RESISTOR (R1) TO BE INSTALLED 1/8" OFF BOARD.
7. USED TO INSTALL Q5.
6. USED TO INSTALL HEATSINK AND TRANS.
5. CABLE TIES ARE 119-0160 (2 REQ'D)
4. ALL RESISTORS ARE 1/4 W, 5%, VALUES IN OHMS
3. HEATSINK PART No. 145-0154
2. TURN CW TO INCREASE
1. P.C. BD. No. 12010180 (153-0208)

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	REQD PER ASSY

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .010 .XXX ± .005 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	P. Tarzian	1/26/77
RELIABILITY		
ENGRG		
DESIGN		
CHECK	RH	1/26/77
DRAFT	K Hayden	1/26/77

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

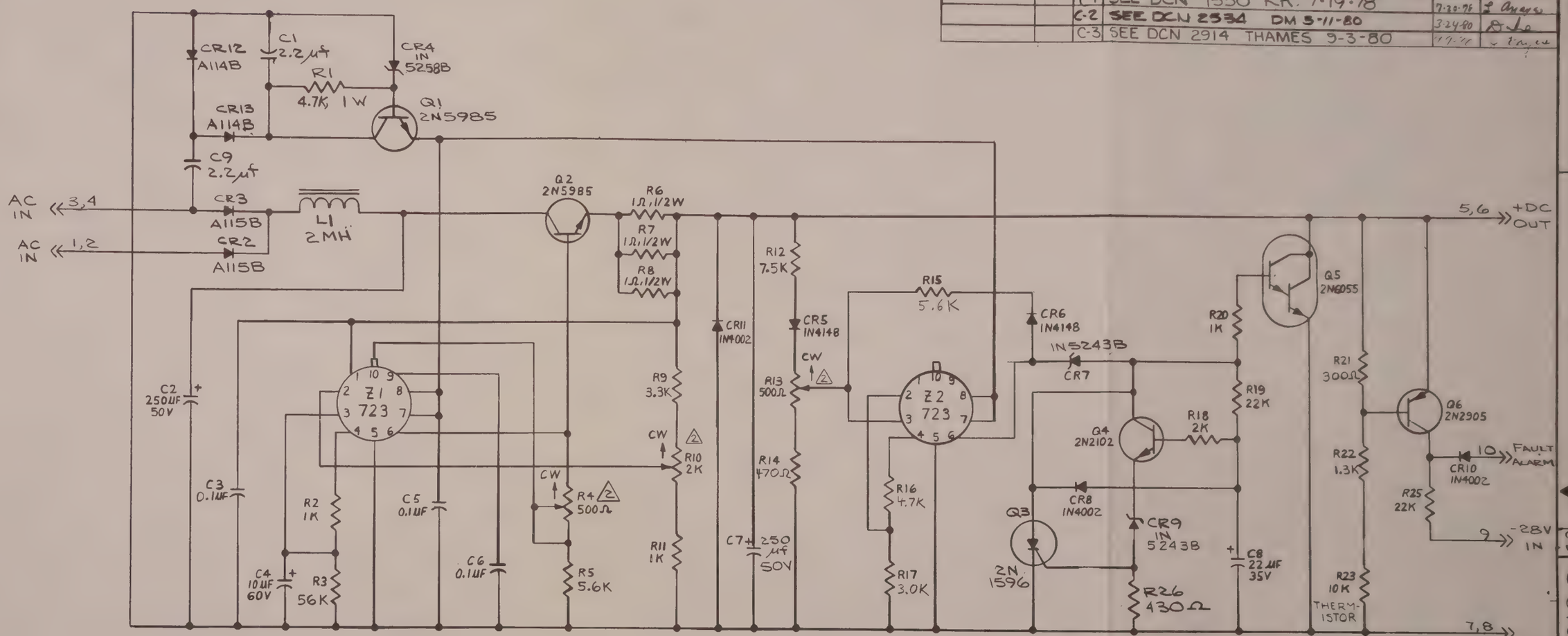
ASSEMBLY, 15V DC POWER SUPPLY— VOLTAGE REGULATOR BD.

SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO.	LTR
C	15895	12010187	152-0315	D-3

SCALE 2/1 SHEET 1 OF 1

CONIC FORM 197A

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	R14 WAS 2K, R15 WAS 4.7K, R16 WAS 1K, R17 WAS 10K PER DCN 6577	7/12/77	PL 7/12/77
		C	SEE DCN 0798 K.R. 2-3-78	2-7-78	P.L.
		C-1	SEE DCN #1530 K.R. 7-19-78	7-20-78	L Anaya
		C-2	SEE DCN 2534 DM 5-11-80	3-24-80	D.L.
		C-3	SEE DCN 2914 THAMES 9-3-80	[illegible]	[illegible]



REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ±.01 .XXX ±.005 HOLES PER AND10387
ANGULAR ±0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	[illegible]	1/26/77
RELIABILITY		
ENGRG		
DESIGN		
CHECK	RH	1/26/77
DRAFT	R. Hagelson	1/26/77

DESIGN ACTIVITY APPROVAL

DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC, 28 VDC POWER SUPPLY REGULATOR BOARD

SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO.	LTR
C	15895	12010189	152-0316	C-3

SCALE 2/1 SHEET 1 OF 1

CONIC FORM 197A

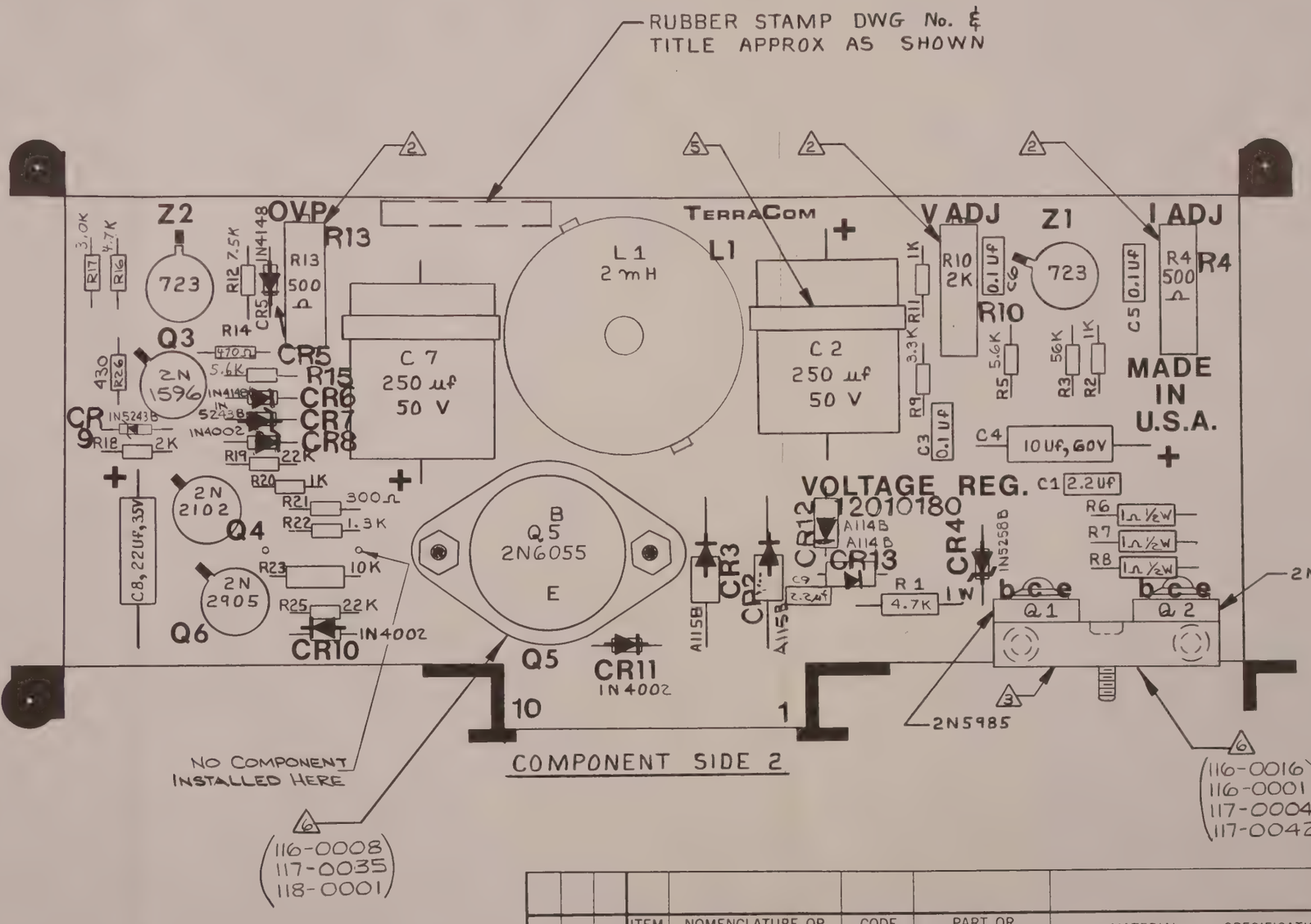
3. CR1 NOT USED
2 TURN CW TO INCREASE
1. ALL RESISTORS 1/4W, 5%,

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

12010189 C3

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED



6 USED ON INSTALLATION OF Q5 Q1 Q2 & HEATSINK.

5 CABLE TIES ARE 119-0160 (2 REQ'D)

4. ALL RESISTORS ARE 1/4 W, 5%, VALUES IN OHMS

3 HEATSINK PART No. 145-0154

2 TURN CW TO INCREASE

1. P.C. BD. No. 12010180 (153-0208)

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	REQD PER ASSY
LIST OF MATERIAL					

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .010 .XXX ± .005
ANGULAR ± 0° 30'
HOLES PER AND10387
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	J. Tomm	1/26/77
RELIABILITY		
ENGRG		
DESIGN		
CHECK	RZ	1/26/77
DRAFT	R. Hayden	1/26/77

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

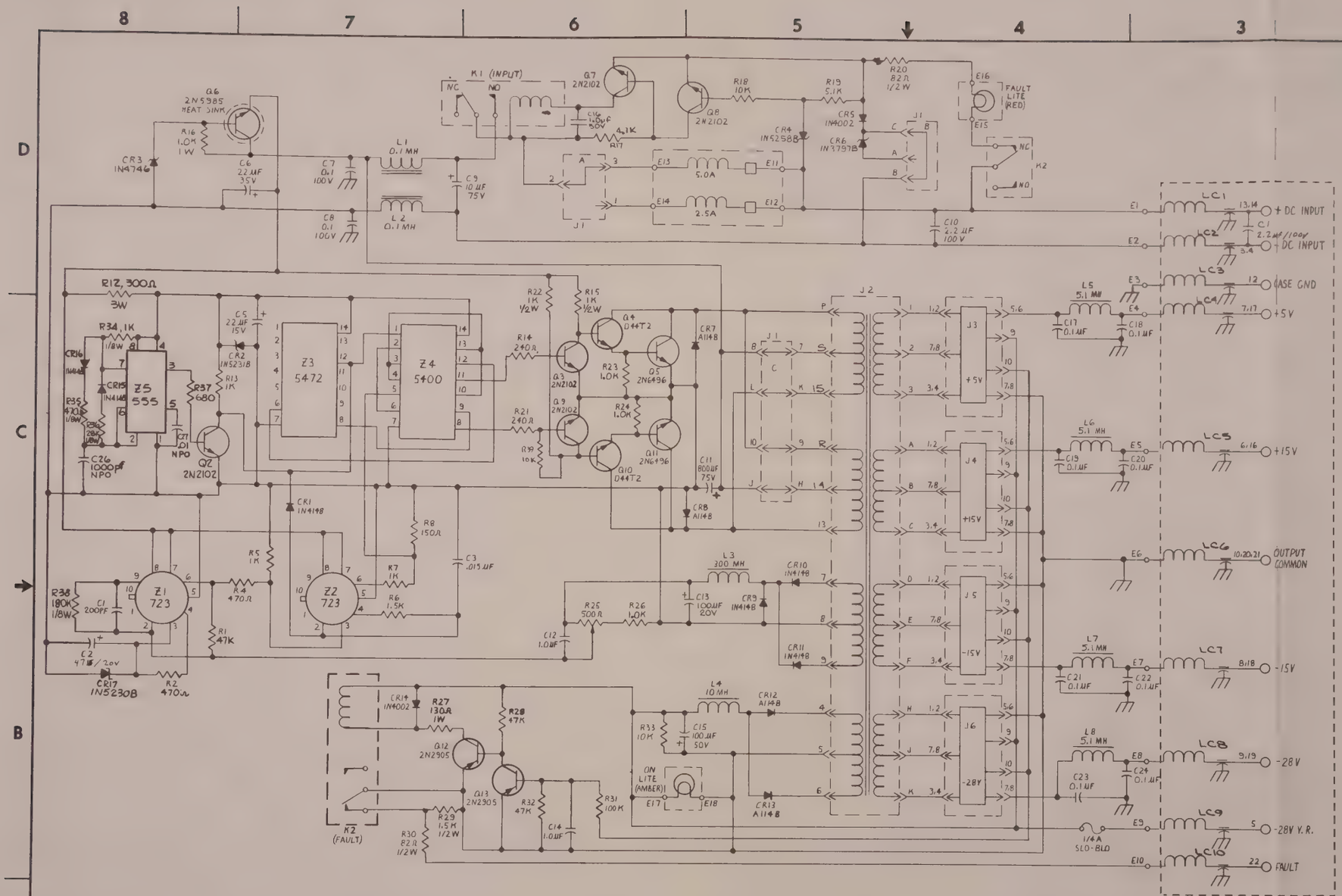
TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

ASSEMBLY, 28V DC POWER SUPPLY— VOLTAGE REGULATOR BD.

SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO.	LTR
C	15895	12010189	152-0316	C-3

SCALE 2/1 SHEET 1 OF 1

CONIC FORM 197A

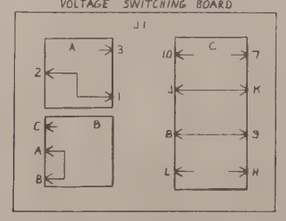


REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	SEE DCN 0566 WC	7-26-77	
B	SEE DCN 0695 12-7-77 KR	12-7-77	
B1	SEE DCN #1488 (MRL) KR 7/17/78	7-18-78	
B2	SEE DCN #1529 (MRL) KR 7/19/78	7-21-78	
B-3	SEE DCN 2475 (MRL) DM 8-11-80	8-22-80	
C	SEE DCN 2639 DM 5-21-80	5-22-80	
D	SEE DCN 2784 (MRL) DAC 7-8-80	7-23-80	
D-1	SEE DCN 2948 DB 9/5/80	9-10-80	
D2	SEE DCN 4110 B.M. 1/28/81	3-9-81	
D-3	SEE DCN 4223 MRL CHG ONLY B.C. 2-24-81		
D4	SEE DCN 4173 B.C. 2-24-81	3/10/81	
D-5	SEE DCN 4399 B.M. 5-7-81	5/7/81	
D06	SEE DCN 4697 NTEX 7-28-81	8-12-81	
FDO	SEE DCN 4710 DW 9-28-81	10-6-81	

2. AREAS WITHIN DASHED LINES ARE NOT PART OF MOTHER BD. P.C. ASSY.
1. RESISTORS ARE 1/4W 5%.

NOTE: UNLESS OTHERWISE SPECIFIED

28V POSITION SHOWN ABOVE
48V POSITION SHOWN BELOW
VOLTAGE SWITCHING BOARD



PROPRIETARY RIGHTS
are involved in the subject matter of this material and all manufacturing, reproduction, use and sales rights pertaining to such matter are expressly reserved. It is submitted in confidence for a specified purpose, and the recipient, by accepting this material agrees that this material will not be used, copied or reproduced in whole or in part, nor its contents revealed in any manner, or to any person, except for the purposes delivered

HIGHEST REF. DES. USED					
R37	C26	L14	Q13	Z5	
CR16	X	T	E18	LC10	
K2					

REF. DES. NOT USED
R9,10,11; C4; Q1

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION
REQD PER ASSY				

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .01 .XXX ± .005
ANGULAR ± 0° 30'
HOLES PER AND10387
ALL MACHINED SURFACES
FINISH

CONTRACT NUMBER

RELEASE	
RELIABILITY	
ENVIRG	
DESIGN	
CHECK	
DRAFT	

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC, MOTHER BOARD, D.C. POWER SUPPLY

SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO.	LTR
D	15895	12010190	152-0317	E00

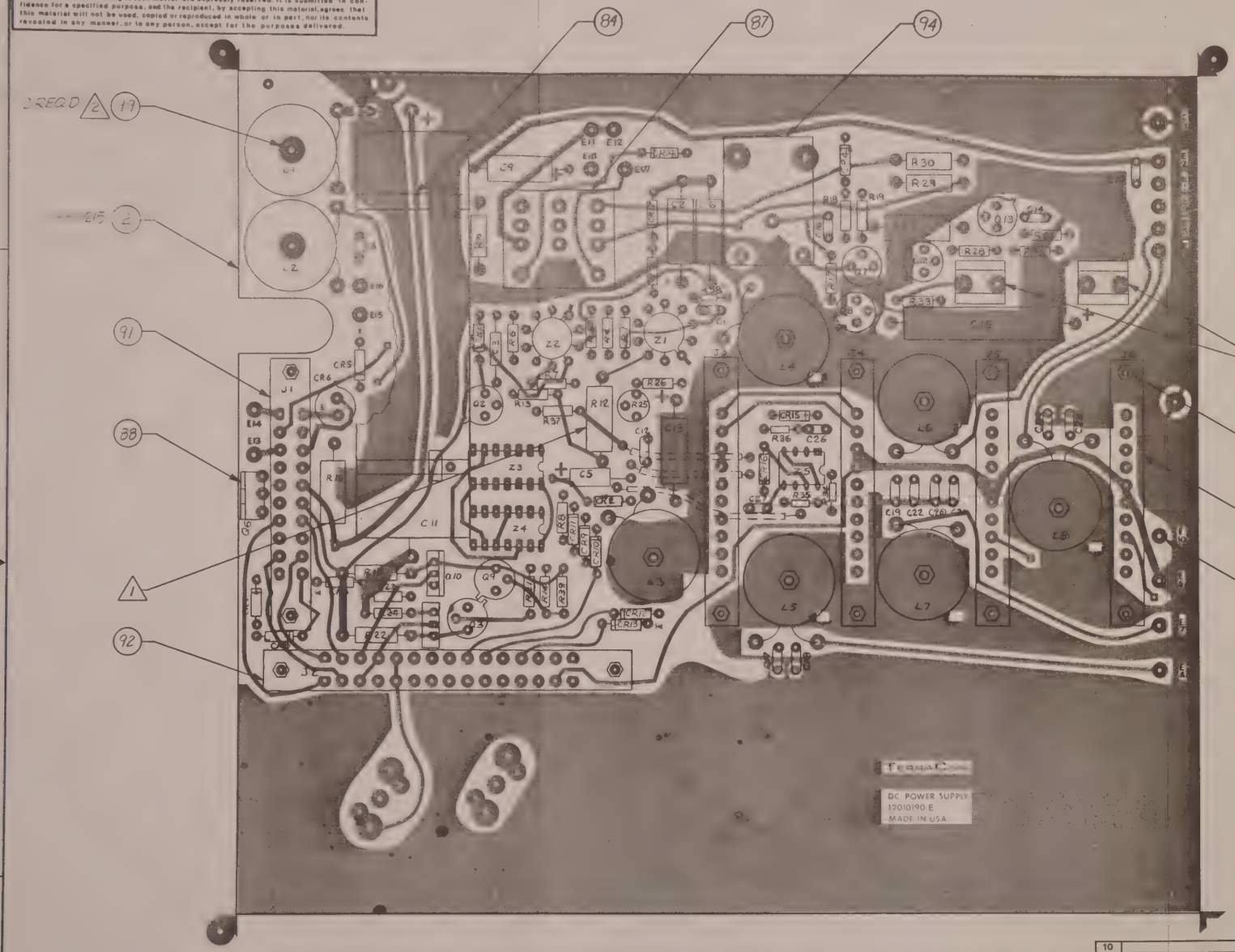
SCALE —
SHEET 1 OF 1

12010190 E00

PROPRIETARY RIGHTS

are involved in the subject matter of this material and all manufacturing, reproduction, use and sales rights pertaining to such matter are expressly reserved. It is submitted in confidence for a specified purpose, and the recipient, by accepting this material, agrees that this material will not be used, copied or reproduced in whole or in part, nor its contents revealed in any manner, or to any person, except for the purposes delivered.

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
			SEE SCHEMATIC FOR REV. HISTORY. M.F.		



COMPONENT SIDE

REF DES.	VALUE
CR1,9 10 11, 15, 16	IN914-IN4148
CR5 14	IN4001Z
CR2	IN1523B
	5.1V 5%
CR4	IN5255B
CR6	22V. 1-½W
CR3	18V. 1W 5%
CR7 & 12 13	GE A1148
Q12, 13	2N2105A
Q2, 3, 7-9	2N2102
Q4-10	CK4T2(GE)
Z3	S5471A1
Z4	S5400N
Z5	NE555V
Z1, 2	MC1723CG
C26	1000pf. 10V
C12, 14, 16	1.0 uf. 50V
C10	2.2 uf. 100V
C7, 8 17-24	0.1 uf. 100V
C27	.01 uf. 100V
C5	22 uf. 15V
C6	22 uf. 35V
C15	100 uf. 50V
C17	500 mf. 5V
C2	47 uf. 20V
C9	10 uf. 75V
C13	1.00 uf. 20V
C1	200pf. 500V
C3	.015 ufd. 50V
CR17	IN5230B
R25	500 Ω. 20%
R34, 35	470 Ω. ½W
R8	150 Ω. ¼W
R14, 21	240 Ω. ¼W
R2, 4	470 Ω, ¼W
R5, 7, 13, 23, 24, 26.	1.0K, ¼W
R6	1.5K, ¼W
R17	4.7K, ¼W
R19	5.1K, ¼W
R18, 33, 39	10K, ½W
R1, 28, 32	47K, ¼W
R31	100K ¼W
R38	180K, ½W
R20, 30	82 Ω, ½W

REF DES.	VALUE
R29	.5K ½W
R15 22	10K ½W
R16	K 1W
R37	680 Ω. ¼W
R12	910 Ω. 3W.
R27	3 Ω. 1W
R36	25K ½W **
J3, 4, 5, 6	10 PIN 3M N
	50-08-2002
J1	CONN PC 20
	50-208-10
J2	CONN PC
	EDGE 30
K1	RELAY PC
	24V SPDT
	10 AMP
L4	COIL 5MHY
	160 TURNS
L3	300 MHY
	100 TURNS
L5-8	5.1 MHY
	±10% 34 TURNS
L1-2	1.2 MHY
	7 TURNS

3. INSTALL L1 THRU L8 WITH LEADS AWAY FROM P.C.B.

2. INSTALL FROM BACKSIDE OF P.C.B.

1. INSTALL R12 1/10 INCH OF P.C.B.

NOTE: UNLESS OTHERWISE SPECIFIED

10		
9		
8		
7	SCHEMATIC	D
6	DRILL OVERLAY	D
5	ASSY OVERLAY	D
4	ARTWORK (SIDE 2)	D
3	ARTWORK (SIDE 1)	D
2	DRILL DRAWING	D
1	ASSEMBLY DRAWING	D
SHT	DRAWING	SIZE

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE
REQD PER ASSY						

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± 01 .XXX ± .005 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	
RELIABILITY	
ENGRG	
DESIGN	
CHECK	
DRAFT	MIKE RINE 10-8-81

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA A LORAL SUBSIDIARY

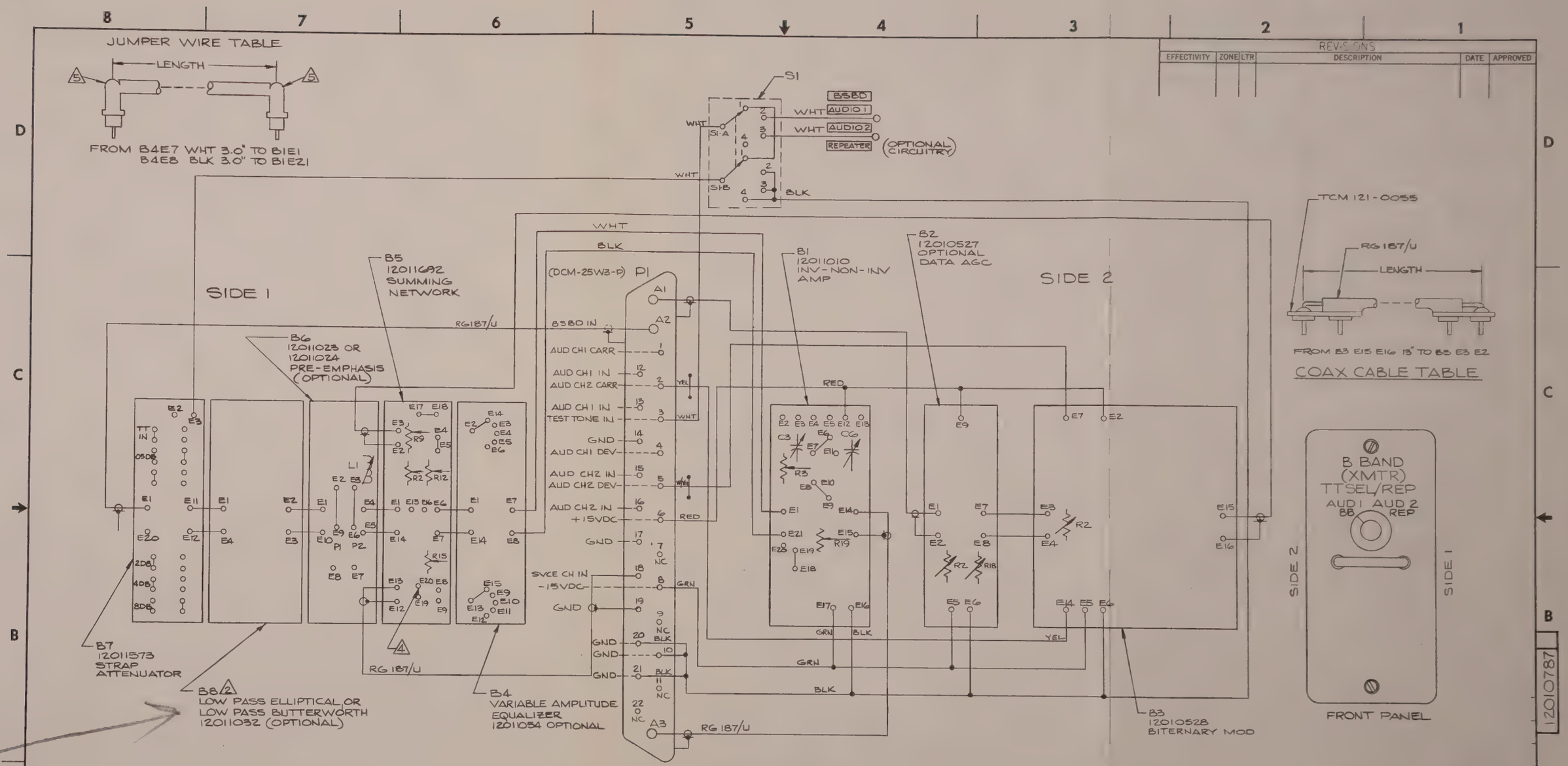
ASSEMBLY DRAWING,
DC POWER SUPPLY

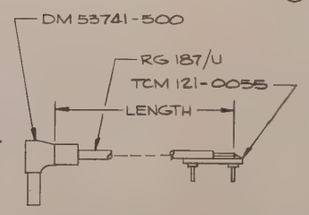
SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO	LTR
D	15895	12010190	152-0317	EOC

SCALE 2:1 SHEET 1 OF 7

CONIC FORM 198A

PRECISION PHOTOGRAPHY INCORPORATED (714) 573-8000





FROM P1A3 6.5" TO B1E15 E14
P1A2 12.5" TO B8E4 E1
P1A1 8.5" TO B2E1 E2

COAX CABLE TABLE

"U" LINK	FROM— TO
RED 119-0033 (0-4")	B2E7-B3E3 B4E1 B5E6 B5E1 B6E4 B6E1 B7E11 B7E1-B8E2
BLACK 119-0032 (0.4")	B2E8-B3E4 B4E14-B5E7 B5E14-B6E5 B6E10-B7E12 B7E20-B8E3
BLUE 119-0022 (0.4")	B4E2-B4E14 B6E2-B6E9 B6E3-B6E6 B4E13-B4E15 B5E17-B5E18 B1E8-B1E9 B1E6-B1E7
BLUE 119-0110 (0.2")	B2E3-B2E4 OPTIONAL OPTIONAL

5. CONNECTORS ON JUMPER WIRES ARE MADE FROM FEED THRU TERMINAL SELECTRO 011-1004-00-0-479.
4. STRAP E18 TO E19 ON B1, AND E19 TO E20 ON B5.
3. WIRES ARE 22 AWG TEFLON WITH CONNECTOR ON ENDS MADE FROM TEFLON SOCKETS CAMBION 450-4352-01-05-19 AND 1/8 DIA HEAT SHRINK TUBE .6" LONG.
2. ELLIPTICAL FILTER SHOWN, BUTTERWORTH FILTER OCCUPIES ONLY HALF OF WIDTH.
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE

LIST OF MATERIAL

QTY REQD	USED ON	NEXT ASSY

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .01 .XXX ± .005 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER
RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

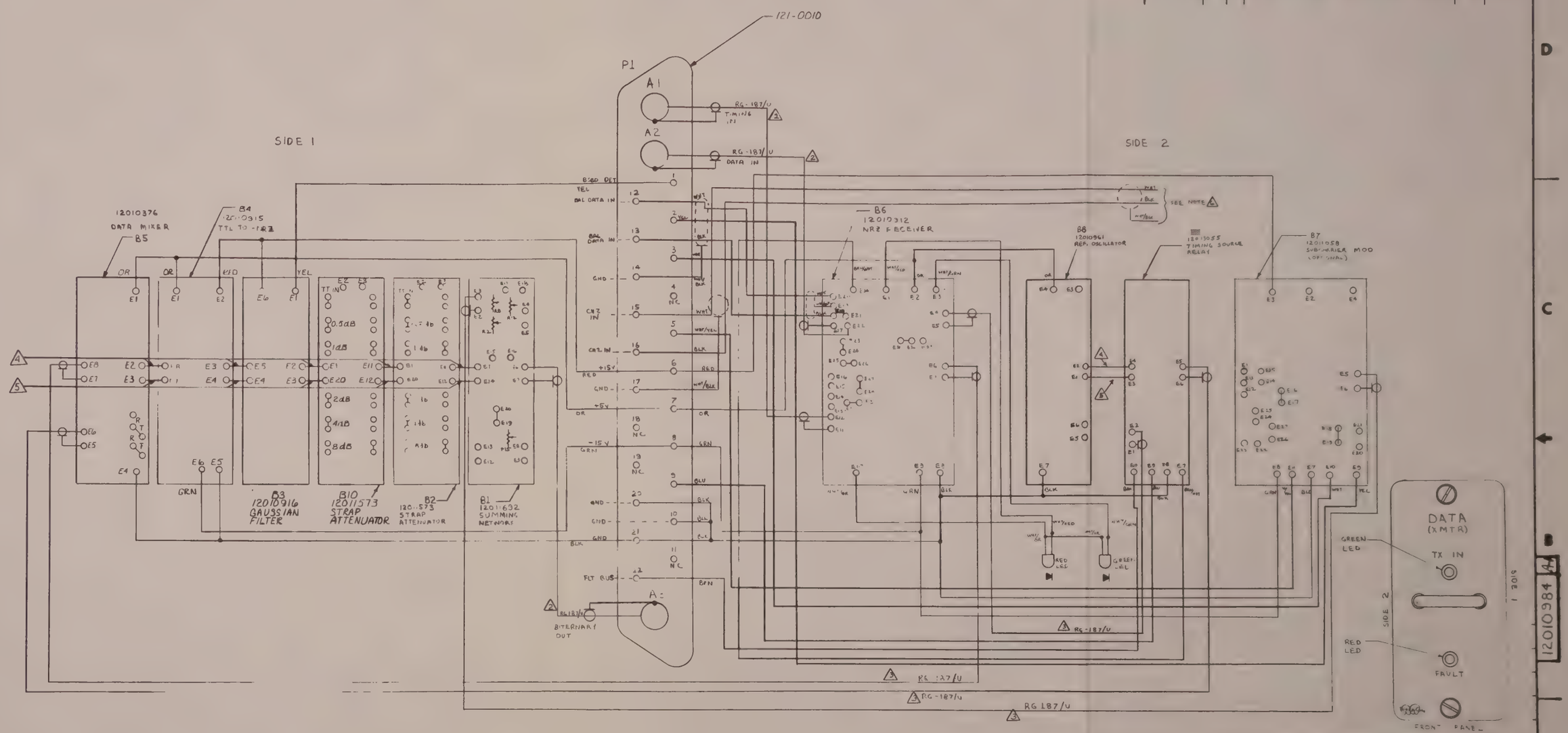
TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA A LORAL SUBSIDIARY

WIRING DIAGRAM
BSBD MODULE WITH
BITERNARY SUBCARRIER-XMTR

SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO.	LTR
D	15895	12010787	157-0398	—

SCALE
SHEET 1 OF 1
CONIC FORM 198A

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	SEE DCN X440 & X470 BC 4-20-81	4/21/81	[illegible]



6 IF SUBCARRIER IS USED THE WHT, WHT/BLK AND BLK WIRES GO TO E1, E13 AND E12 OF B7. OTHERWISE TO E16, E15 AND E14 OF B6

5 BLACK U-LINK .4" TCM 119-0032

4 RED U-LINK .4" TCM 119-0033

3 SEE FIG 2

2 SEE FIG. 1

1. WIRES ARE 22 AWG TEFLON WITH CONNECTOR ON MADE FROM TEFLON SOCKETS, CAMBION 450-4352-01-03-19 (TERRACOM P/N 119-0094) AND 1/8" DIA HEAT SHRINK TUBE .6" LONG.

NOTE: UNLESS OTHERWISE SPECIFIED

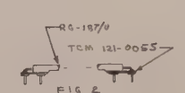


FIG 2

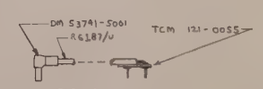


FIG. 1

QTY REQD	USED ON	NEXT ASSY

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .01 .XXX ± .005 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE		
RELIABILITY		
ENGRG	B. ANDERSON	4-13-78
DESIGN		
CHECK		
DRAFT	B. ANDERSON	4-13-78

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA A LORAL SUBSIDIARY

WIRING DIAGRAM — DATA (XMTR) MODULE NRZ INPUT

SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO.	LTR
D	15895	12010984	130-0467	A-1

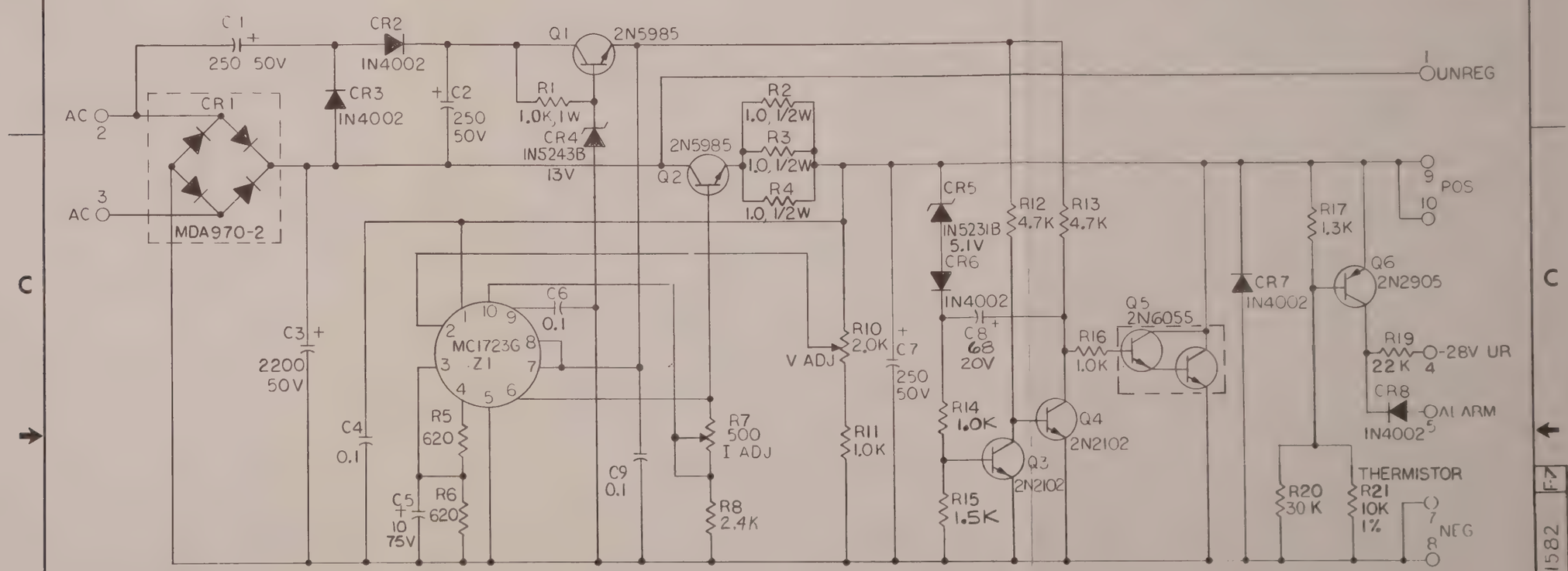
SCALE —
SHEET 1 OF 1

12010984 A1

PROPRIETARY RIGHTS
are involved in the subject matter of this material and all manufacturing, reproduction, use and sales rights pertaining to such matter are expressly reserved. It is submitted in confidence for a specified purpose, and the recipient, by accepting this material, agrees that this material will not be used, copied or reproduced in whole or in part, nor its contents revealed in any manner, or to any person, except for the purposes delivered.

REVISIONS

EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		F3	SEE DCN #1390 KR 6-13-78	6-15-78	[illegible]
		F4	SEE DCN #1537(MRL)KR 7-19-78	[illegible]	[illegible]
		F5	SEE DCN 2454 DM 1-23-80	1-24-80	[illegible]
		F7	SEE DCN 4132 B.C. 2-2-81	2-3-81	[illegible]



4 REF DESIG NOT USED: R9 AND R18
3 ALL RESISTORS ARE 1/4W, 5%, VALUE IN OHMS
2 ALL CAPACITOR VALUES ARE IN MICROFARADS
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	152-0135 STOCK NO.

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .010 .XXX ± .005 ANGULAR ± 0° 30'
HOLES PER AND10387
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	[illegible]	10/24/74
RELIABILITY		
ENGRG		
DESIGN		
CHECK		
DRAFT	D. PEARSON	6-17-74

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC —
AC TO DC REGULATOR
5 VOLT

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011582	F7

SCALE — SHEET OF

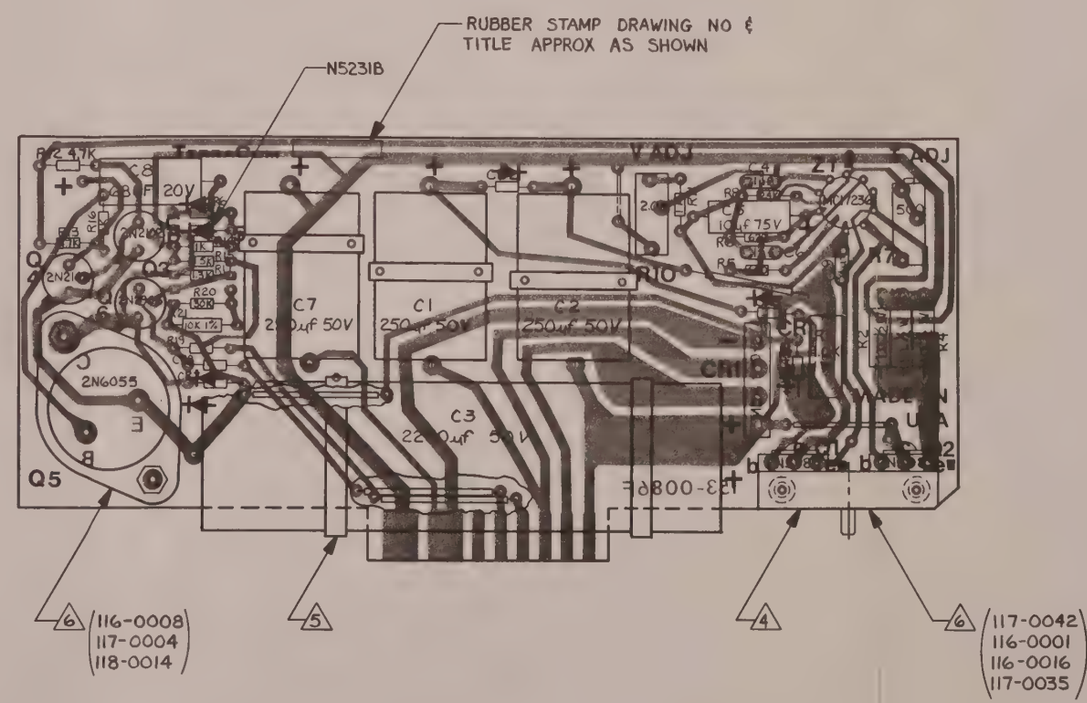
CONIC FORM 197A

12011582 F7

PROPRIETARY RIGHTS
are involved in the subject matter of this material and all manufacturing, reproduction, use and sales rights pertaining to such matter are expressly reserved. It is submitted in confidence for a specified purpose, and the recipient, by accepting this material, agrees that this material will not be used, copied or reproduced in whole or in part, nor its contents revealed in any manner, or to any person, except for the purposes delivered

REVISIONS

EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		F	SEE DCN 0209	8-8-75	AHB
		—	SEE DCN 0249	10-3-75	AHB
			SEE DCN 0652	10-19-77	
		F-2	SEE DCN 0796	2-7-78	DL
		F-3	SEE DCN 1390	6-15-78	DL
		F-4	SEE DCN 1537	7-20-78	L A
		F-5	SEE DCN 2454	1-24-80	
		F-6	SEE DCN 2766		
		F-7	SEE DCN 4132	2-3-81	D K



6. USED TO INSTALL Q5 & HEATSINK
5. CABLE TIES ARE 119-0160 (5 REQ'D)
4. HEATSINK P/N 145-0154
3. ALL DIODES ARE IN4002
2. P.C. BD. PART NO 153-0086-F
1. RESISTOR VALUES ARE SPECIFIED IN OHMS AND ARE 1/4W ± 5%.

NOTE: UNLESS OTHERWISE SPECIFIED

SHT	DRAWING	SIZE
10		
9		
8	SCHEMATIC	
7	DRILL OVERLAY	D
6	ASSEMBLY OVERLAY	D
5	SOLDER MASK	D
4	ARTWORK (SIDE 2)	D
3	ARTWORK (SIDE 1)	D
2	DRILL DRAWING	C
1	ASSEMBLY DRAWING	C

QTY REQD	USED ON	NEXT ASSY

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .01 .XXX ± .005 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER
RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT R. BISHOP 1-26-82
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA A LORAL SUBSIDIARY

ASSEMBLY DRAWING 5V REGULATOR

SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO	LTR
D	15895	12011582	152-0135	F 7

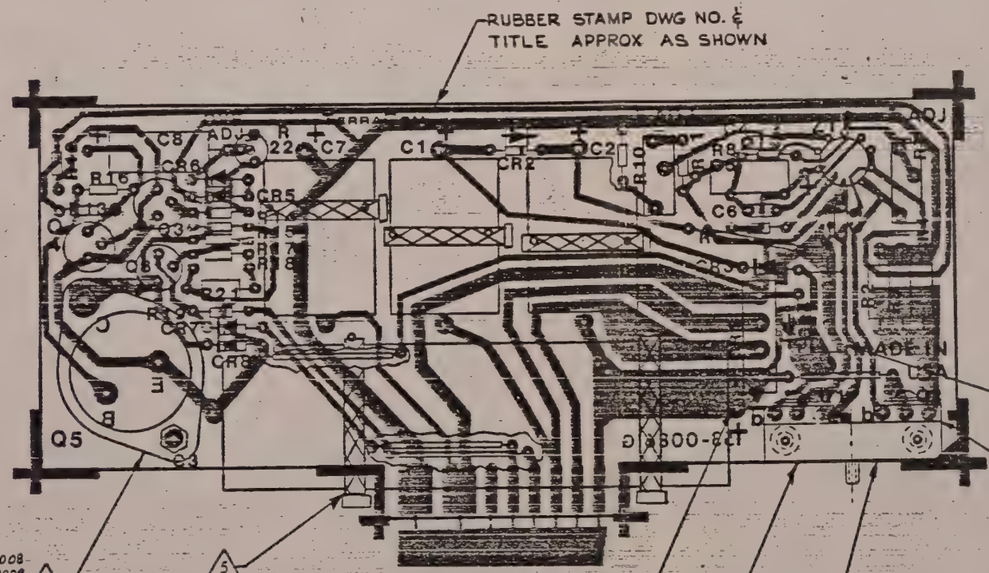
SCALE 2/1 SHEET OF

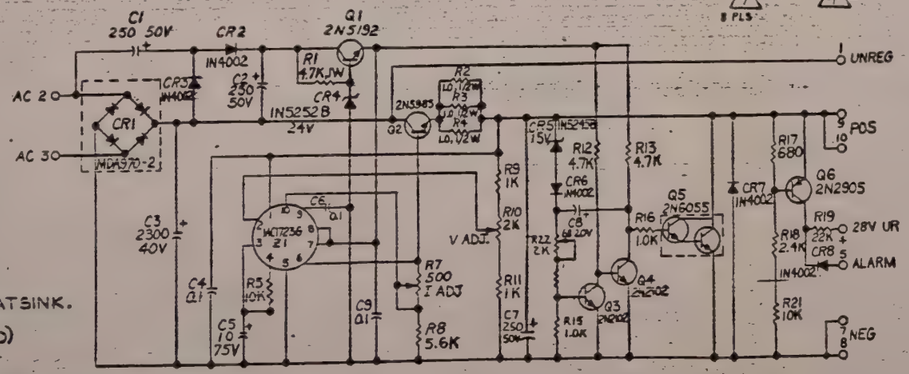
PRECISION PHOTOGRAPHY INCORPORATED (714) 577

CONIC FORM 190A

REVISIONS					
ZONE/LTR	DESCRIPTION	DATE	CHK	DATE	APPROVED
C00	REV PER DCN 7898	29 JAN86	IR	2-7-86	

RUBBER STAMP DWG NO. & TITLE APPROX AS SHOWN





9 CAPS SOLDERED AFTER TY-WRAP FOR LEAD STRESS RELIEF.

8 HEATSINK CMPD BOTH SIDES

7 'R1' IS TO BE RAISED OFF PCBD. .12"

6 USED TO INSTALL Q5, Q1, Q2 & HEATSINK.

5 CABLE TIES ARE 119-0160 (5 REQD)

4 HEATSINK P/N 145-0154.

3. ALL RESISTORS ARE 1/4W, 5%, VALUES IN OHMS.

2. ALL UNMARKED DIODES ARE IN4002.

1. P.C. BOARD PART NO 153-0086-F.

NOTE: UNLESS OTHERWISE SPECIFIED

PROPRIETARY RIGHTS

are reserved in the subject matter of this material and all manufacturing reproduction use and sales rights pertaining to such matter are expressly reserved. It is submitted in confidence for a specified purp. ose and the recipient by accepting this material agrees that this material will not be used copied or reproduced in whole or in part nor its contents revealed in any manner or to any person except for the purposes delivered

QTY REQD	USED ON	NEXT ASSY

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR XX ±.03 XXX ±.010 HOLES PER AND10387
ANGULAR ±0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

DRAWN BY	J.RICHARDS	1-29-86
HECK BY		
DESIGNER		
MECH ENG		
ELECT ENG		
PROJECT		
RELEASE		2-7-86

DESIGN ACTIVITY APPROVAL

DESIGN APPROVAL

LORAL TERRACOM 9020 Balboa Ave San Diego, CA 92123

ASSY DWG

15V REGULATOR

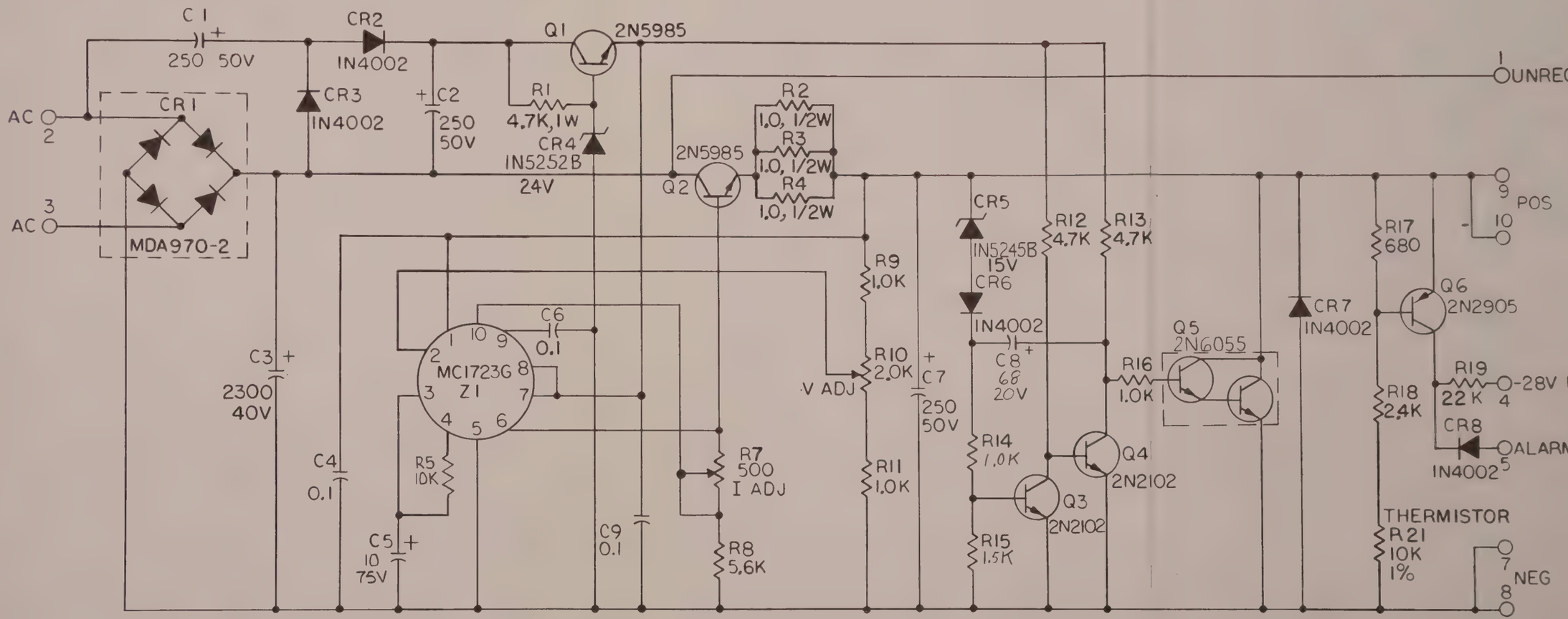
SIZE	CODE IDENT NO	DRAWING NUMBER	STOCK NO	LTR
D	054296	12011583	152-0136	C

SCALE 2/1 SHEET 1 OF 1

LMC018C

12011583

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		F	SEE DCN 0207	8-11-75	AHB
		F-2	SEE DCN #1533 (MRL) KR 7-19-78	7-20-78	S Amaya
		F-3	SEE DCN 1660 T.R. 3 22 79	3/28/79	
		F-4	SEE DCN 2459 DM 1-23-8	1-24-80	



4 REF DESIG NOT USED: R6 AND R20

3 ALL RESISTORS ARE 1/4W, 5%, VALUE IN OHMS

2 ALL CAPACITOR VALUES ARE IN MICROFARADS

1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	152-01316 STOCK NO
		LIST OF MATERIAL				

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .010 .XXX ± .005
ANGULAR ± 0° 30'
HOLES PER AND10387
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	L Plummer	10/24/74
RELIABILITY		
ENGRG		
DESIGN		
CHECK		
DRAFT	D. PEARSON	6-17-74

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

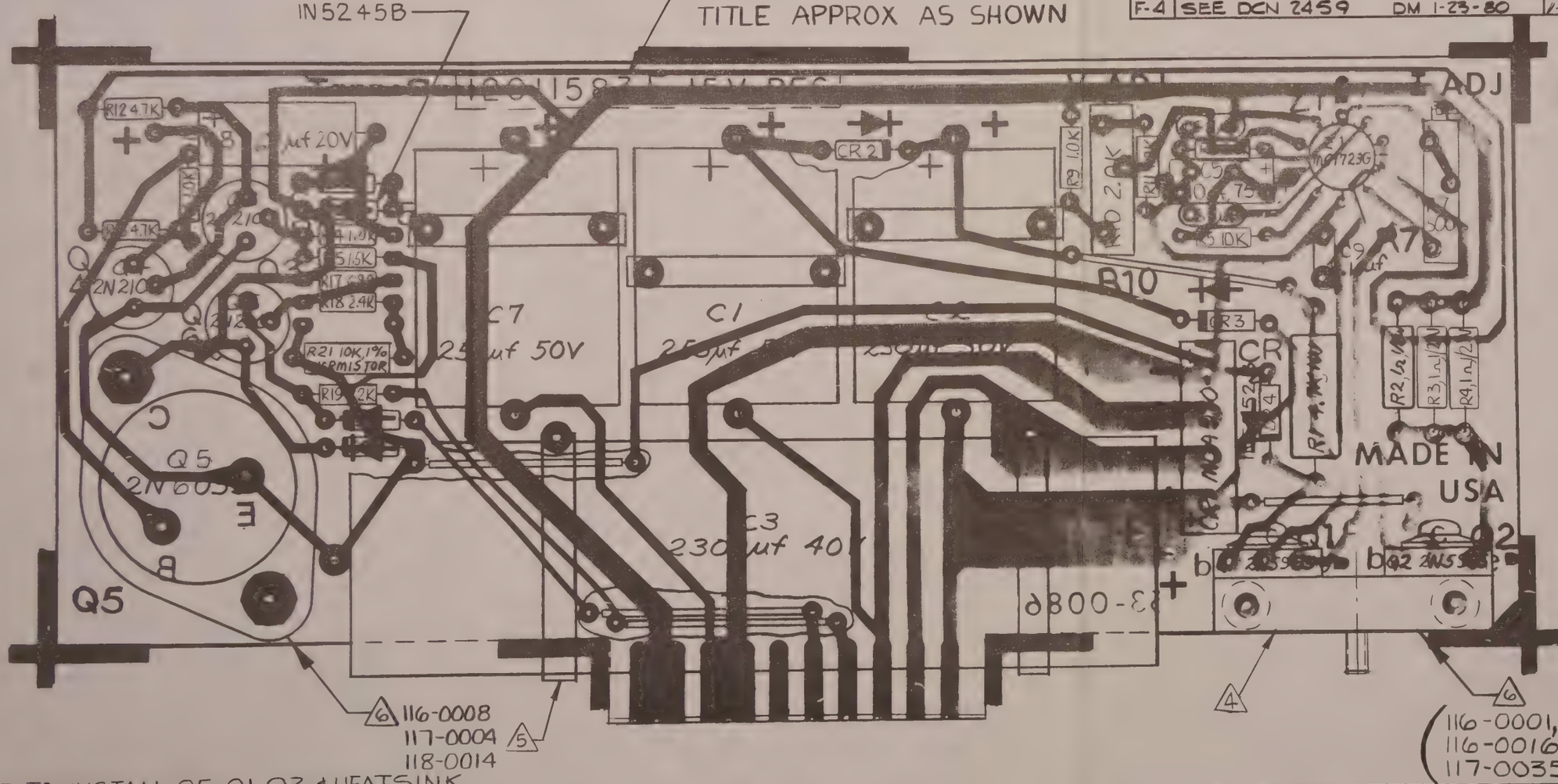
SCHEMATIC—
AC TO DC REGULATOR
15 VOLT

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011583	F-4

SCALE —— SHEET OF

CONIC FORM 197A

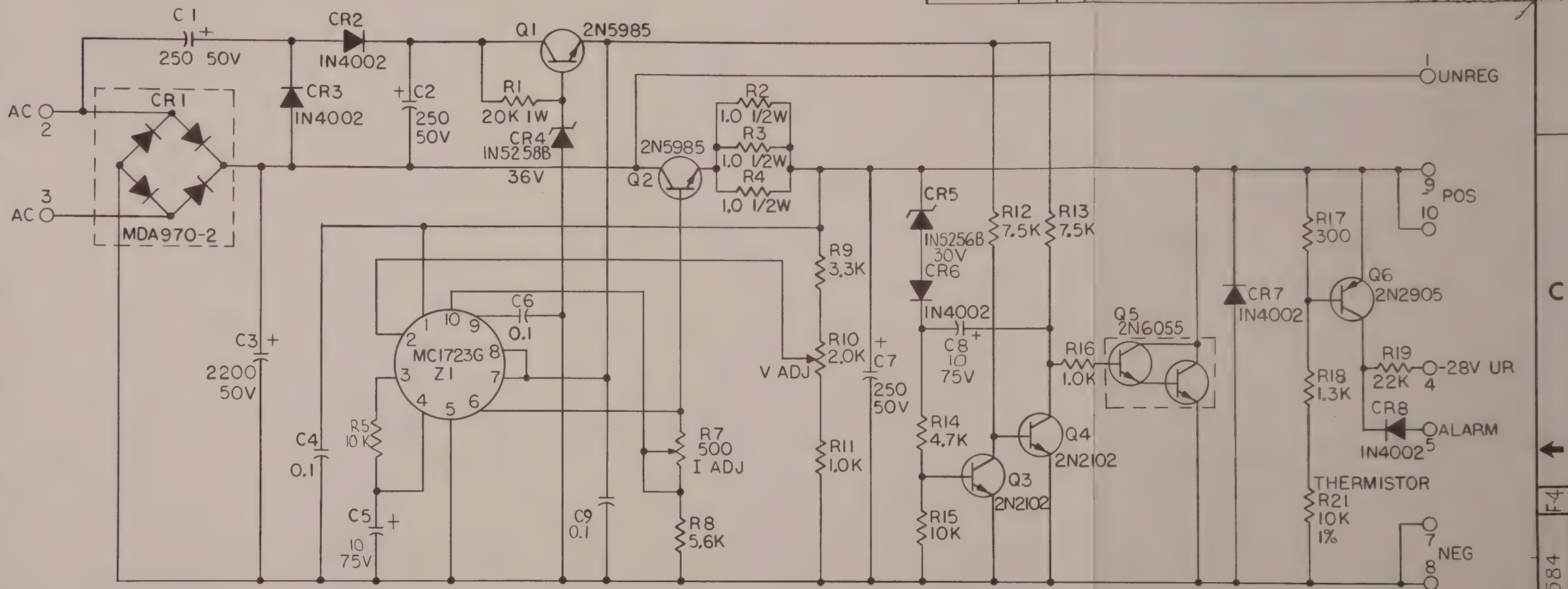
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
F	SEE DCN 0207	8-8-75	AHB
F-1	SEE DCN 0797 KR 2-3-78	2-7-78	
F-2	SEE DCN #1533 (MRL) KR 7-19-78	7-20-78	
F-3	SEE DCN 1860 ZR 3-22-79	3/23/79	
F-4	SEE DCN 2459 DM 1-23-80	1-24-80	



6 USED TO INSTALL Q5, Q1, Q2 & HEATSINK.
5 CABLE TIES ARE 119-0160 (5 REQD)
4 HEATSINK P/N 145-0154
3. ALL RESISTORS ARE 1/4W, 5%, VALUES IN OHMS.
2. ALL UNMARKED DIODES ARE IN4002
1. P.C. BD. PART NO 153-0086F
NOTES: UNLESS OTHERWISE SPECIFIED

PC ASSY NO. 152-0136	Stock No. 152-0136	TERRACOM A DIVISION OF CONIC CORP
PART NO. 153-0086-F	PREPARED A. BERGER	P.C. BOARD ASSY- 15V REGULATOR
	CHECKED BY	
	DATE 10-21-74	DWG NO 12011583 REV F-4
	APPROVED L Plummer 10/24/74	SCALE 2:1 SHEET 1 OF 1

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		F	SEE DCN 0208	8-12-75	AHB
		–	SEE DCN 0248	10-3-75	AHB
		F-1	SEE DCN 0795 KR 2-2-78	2-7-78	KR
		F-2	SEE DCN 1532 (MRL) KR 7-19-78	7-20-78	S Unger
		F-3	SEE DCN 2457 DM 1-23-80	1-24-80	
		F-4	SEE DCN 2896 DB 8-15-80	8-18-80	



4 REF DESIG NOT USED: R6 AND R20
3 ALL RESISTORS ARE 1/4W, 5%, VALUE IN OHMS.
2 ALL CAPACITOR VALUES ARE IN MICROFARADS
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION

LIST OF MATERIAL

152-0137 STOCK NO.

UNLESS OTHERWISE SPECIFIED	CONTRACT NUMBER
DIMENSIONS ARE IN INCHES	
TOLERANCES	
LINEAR .XX ± .010 .XXX ± .005 HOLES PER AND10387	ANGULAR ± 0° 30′
ALL MACHINED SURFACES √	
FINISH	

RELEASE	J Plummer	10/24/74
RELIABILITY		
ENGRG		
DESIGN		
CHECK		
DRAFT	D. PEARSON	6-17-74
DESIGN ACTIVITY APPROVAL		
DESIGN APPROVAL		

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC–
AC TO DC REGULATOR
28 VOLT

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011584	F-4

SCALE —— SHEET OF

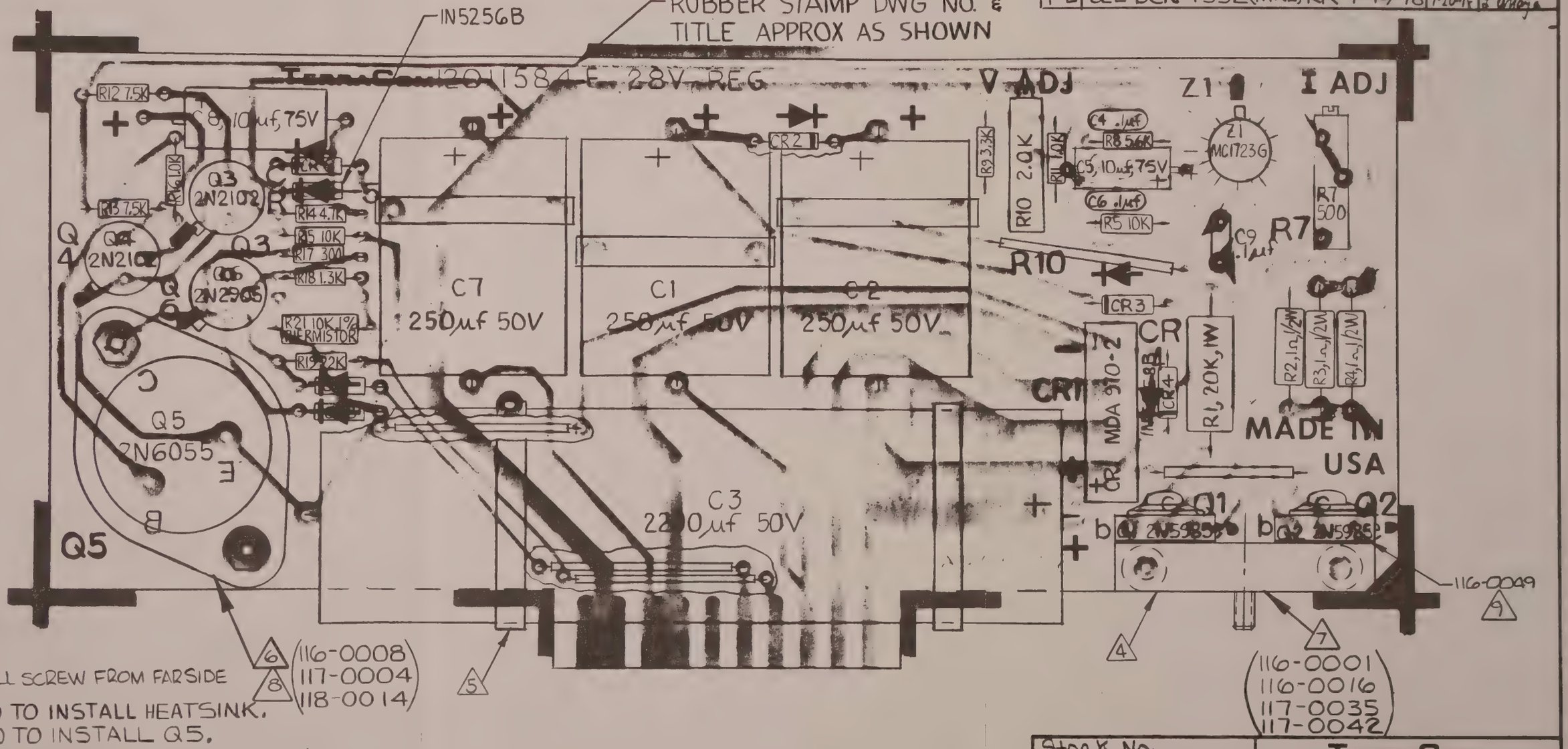
CONIC FORM 197A

F-4 12011584

LTR	DESCRIPTION	DATE	APPROVED
F-3	SEE DCN 2457 DM 1-23-80	1-24-80	

REVISIONS

LTR	DESCRIPTION	DATE	APPROVED
F	SEE DCN 0208	8-12-75	AHB
-	SEE DCN 0248	10-3-65	AHB
F-1	SEE DCN 0795 KR 2-2-78	2.7.78	DI.
F-2	SEE DCN #1532(MRL) KR 7-19-78	7-20-78	L Amaya



8 INSTALL SCREW FROM FARSIDE

7 USED TO INSTALL HEATSINK.

6 USED TO INSTALL Q5.

5 CABLE TIES ARE 119-0160 (5 REQD)

4 HEATSINK P/N 145-0154.

3 RESISTORS ARE 1/4W, 5%, VALUES IN OHMS

2. ALL DIODES ARE IN4002.

1. P.C. BD. PART NO. 153-0086-F

NOTES: UNLESS OTHERWISE SPECIFIED

9 APPLY HEATSINK CMPD TO BOTH SIDES OF INSULATORS

PC ASSY NO. 152-0137

Stock No. 153-0086

PREPARED BY A. BERGER

CHECKED BY

DATE 10-17-74

APPROVED L Plummer 10/24/74

TERRACOM
A DIVISION OF CONIC CORP

P.C. BD. ASSY-
28V REGULATOR

DWG NO. 12011584 REV F-4

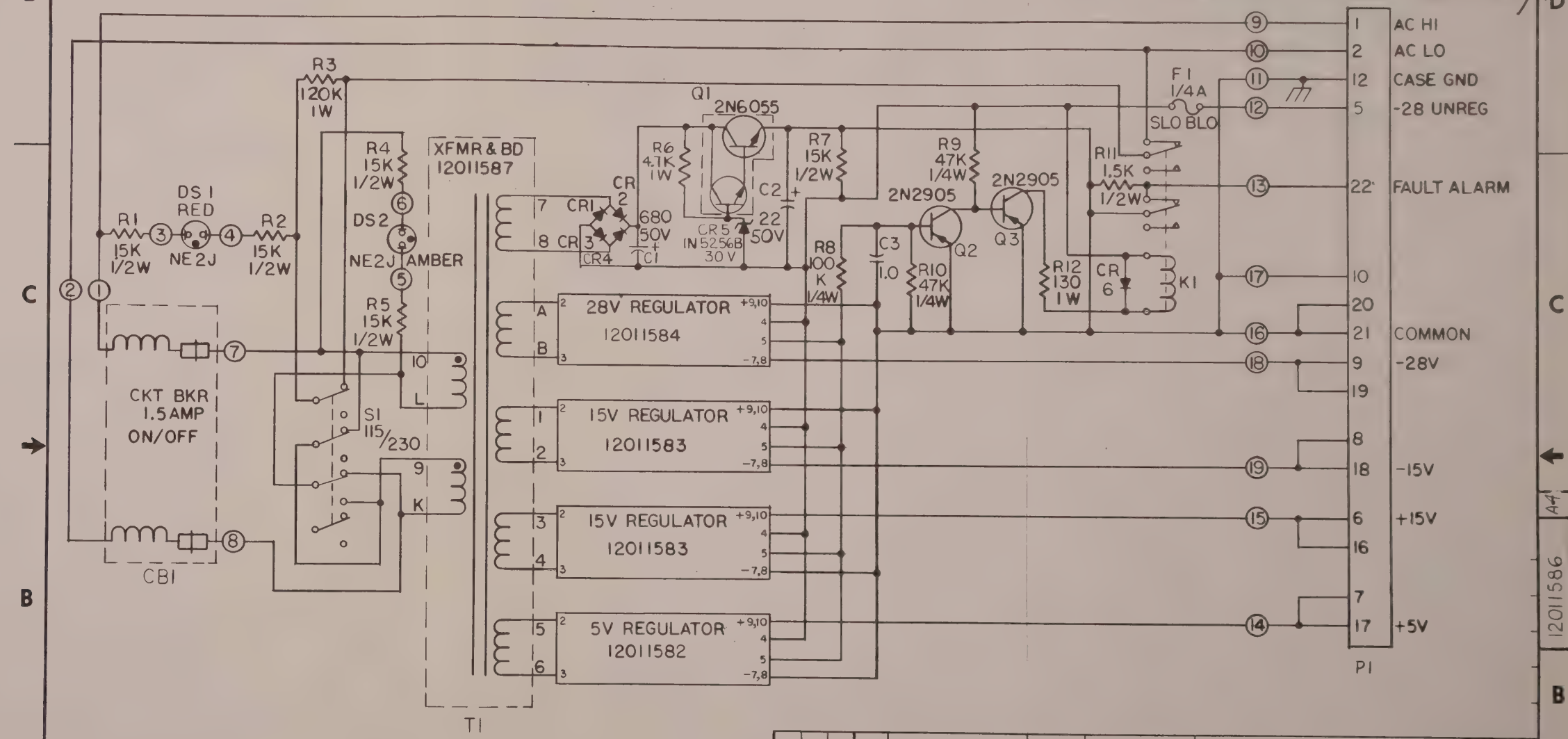
SCALE 2:1 SHEET OF

PROPRIETARY RIGHTS
are involved in the subject matter of this material and all manufacturing, reproduction, use and sales rights pertaining to such matter are expressly reserved. It is submitted in confidence for a specified purpose, and the recipient, by accepting this material, agrees that this material will not be used, copied or reproduced in whole or in part, nor its contents revealed in any manner, or to any person, except for the purposes delivered.

A-4	SEE DCN 4218	B.C. 2-24-81	[illegible] 3-5-81

REVISIONS

EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A			
		–	SEE DCN 0250	10-3-75	AHB
		A-1	SEE DCN 0793 MRL ONLY KR 2-2-78	2-7-78	[illegible]
		A-2	DCN 2031 2R 6-11-79	[illegible]	6/13/79
		A-3	SEE DCN 3063 B.C. 12-15-80	12-16-80	[illegible]



REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	152-0139 STOCK NO.

LIST OF MATERIAL

4. ALL RESISTOR VALUES ARE IN OHMS
3. ALL CAPACITOR VALUES ARE IN MICROFARADS
2. ALL DIODES ARE IN4002
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .010 .XXX ± .005 ANGULAR ± 0° 30'
HOLES PER AND10387
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	[illegible]	10/24/74
RELIABILITY		
ENGRG		
DESIGN		
CHECK	[illegible]	
DRAFT	D PEARSON	6-14-74

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC-
POWER SUPPLY

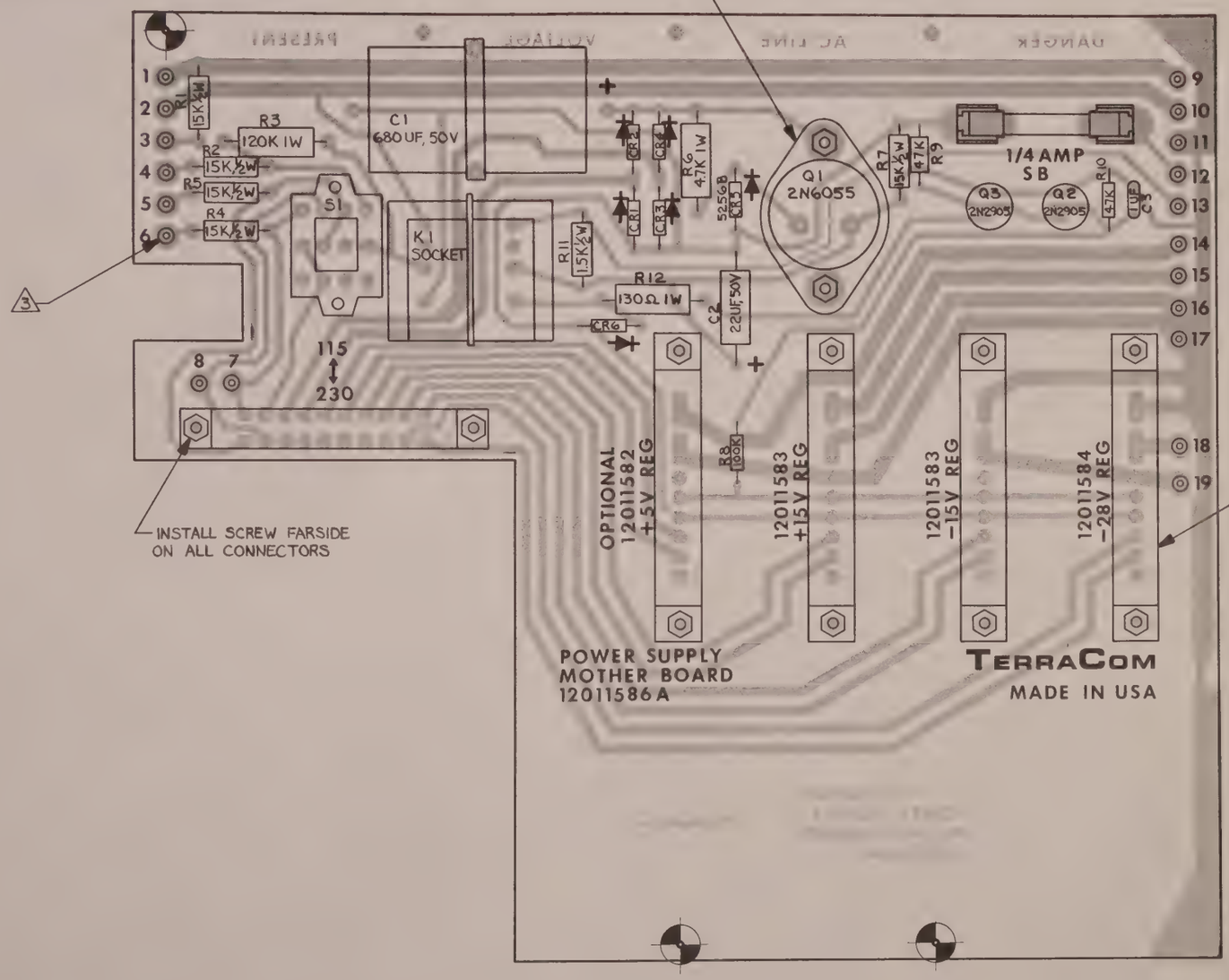
SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011586	A-4

SCALE —
SHEET 1 OF 1

CONIC FORM 1974

PROPRIETARY RIGHTS
are involved in the subject matter of this material and all manufacturing, reproduction, use and sales rights pertaining to such matter are expressly reserved. It is submitted in confidence for a specified purpose, and the recipient, by accepting this material, agrees that this material will not be used, copied or reproduced in whole or in part, nor its contents revealed in any manner, or to any person, except for the purposes delivered.

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
			REDRAWN KR 3-17-78	4-6-78	
		A-3	SEE DCN 3063 BC 12-15-80	12-6-78	



5. USED TO INSTALL CONNECTOR
4. USED TO INSTALL Q1
3. BIFURCATED TERMINALS ARE LERCO #50-62 (TCM 119-0009)
2. ALL DIODES ARE IN4002
1. RESISTOR VALUES ARE SPECIFIED IN OHMS AND ARE 1/4W ±5%.

NOTE: UNLESS OTHERWISE SPECIFIED

SHT	DRAWING	SIZE
10		
9		
8	SCHEMATIC	
7	DRILL OVERLAY	D
6	ASSEMBLY OVERLAY	D
5	SOLDER MASK	D
4	ARTWORK (SIDE 2)	D
3	ARTWORK (SIDE 1)	D
2	DRILL DRAWING	C
1	ASSEMBLY DRAWING	C

QTY REQD	USED ON	NEXT ASSY

PC ASSY 152-0139

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE
REQD PER ASSY	LIST OF MATERIAL					

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .01 .XXX ± .005 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	
RELIABILITY	
ENGRG	
DESIGN	
CHECK	
DRAFT	R. BISHOP 1-22-82

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA A LORAL SUBSIDIARY

ASSEMBLY DRAWING
MOTHER BOARD
POWER SUPPLY

SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO	LTR
D	15895	12011586	152-0139	A-4

SCALE 2/1 SHEET 1 OF 1

PRECISION PHOTOGRAPHY INCORPORATED (714) 578-4000

PROPRIETARY RIGHTS

are involved in the subject matter of this material and all manufacturing, reproduction, use and sales rights pertaining to such matter are expressly reserved. It is submitted in confidence for a specified purpose and the recipient, by accepting this material, agrees that this material will not be used, copied or reproduced in whole or in part, nor its contents revealed in any manner or to any person except for the purposes delivered.

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	PER DCN 0484 WBC	4-14-77	
		B	PER DCN 0545 WB	5-2-77	
		C	SEE DCN 0568 WBC	7-22-77	KR 8.8.77
		D	DCN 0759 "MRL CHG ONLY" KR 11-4-77		T. Schmidt
		D1	DCN 0867 "MRL CHG" KR 2-7-78	2-8-78	KR
		E2	DCN 4620 DN 3-6-81	3-6-81	D. Brandt
		E	DCN 4796 DN 3-18-81	3-19-81	D. Brandt
		F	DCN 4815 DN 11-21-81	12-9-81	D. Brandt
		G	DCN 4884 DN 12-9-81	12-10-81	D. Brandt

SIDE 1

SIDE 2

B7 DEMODULATOR BASE BAND INPUT 12010330

B6 70 MHZ F.M. DEMODULATOR (RCVR) 12011007

B5 INVERTING NON-INVERTING AMPLIFIER 12011010

B1 VARIABLE AMPLITUDE EQUALIZER 12011054 (OPTIONAL)

B2 LOW PASS FILTER 12011032

B3 PHASE EQUALIZER 12011022

B4 70 MHZ LIMITER 12011598

M1 50-0-50 mA (REAR VIEW)

S1 FREQUENCY

DEMOD DRIVE 820Ω 1/4W

REAR VIEW OF SWITCH (S1) KEY-WAY FACES TOWARD BOTTOM

(DCM-25W3-P) P1

FERRITE BEADS (5) PIN 107-0017

FERRITE BEADS (5 EA) PIN 107-0017

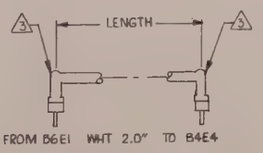
COAX

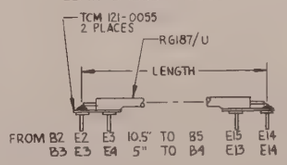
BNC CONNECTOR

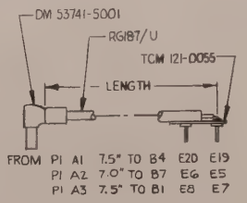
I.F MON

WHT/RED, WHT/BLK, WHT/ORN, BLK, RED, +15VDC, GRN, -15VDC, W/GRN, ORN, WHT

COAX CABLE TABLES







"U" LINK	FROM — TO	
119-0033-RED (0.4")	B1 E1 — B2 E2 B3 E2 — B4 E11	
119-0032 BLACK (0.4")	B1 E14 — B2 E3 B3 E1 — B4 E12	
119-0022 BLUE (0.4")	B1 E2 — B1 E14 B1 E13 — B1 E15 B6 E9 — B5 E10 B5 E6 — B5 E11	OPTIONAL
119-0110 BLUE (0.2")	B4 E17 — B4 E18	

ASSEMBLY	DESCRIPTION
130-0112	PC MODULE XMTR FMR
130-0241	MOD. FMR XMTR MECH ASSY P/O 130-0112

NOTE: HARNESS IS P/N 137-0166.

FRONT PANEL: FMR (XMTR), FREQUENCY, DEMOD DRIVE, I.F MON; SIDE 2, SIDE 1

⚠3 CONNECTORS ON JUMPER WIRES ARE MADE FROM FEED-THRU TERMINAL SELECTRO 011-1004-00-0-479, AND 1/8" DIA HEAT SHRINK TUBE .6" LONG.

2. WIRES ARE 22 AWG TEFLON WITH CONNECTOR ON ENDS MADE FROM TEFLON SOCKETS CAMBION 450-4352-01-03-19, AND 1/8" DIA HEAT SHRINK TUBE .6" LONG.

1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	REQD PER ASSY

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR XX ± .03 XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE		2-10-75
RELIABILITY		
ENGRG	TOM COE	
DESIGN		
CHECK		
DRAFT	J. Berger	11-1974

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

WIRING DIAGRAM- FMR MODULE (XMTR)

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12011600	G

SCALE — SHEET 1 OF 1

12011600 G

LTR	DESCRIPTION	DATE	APPROV.
H1	SEE DCN #068 B. MIKKELSON	1-9-81	
H2	SEE DCN 4608 DW 8-17-81	12/11/81	

LTR	DESCRIPTION	DATE	APPROV.
D	SEE DCN 0483		
E	SEE DCN 0873 (MRL) KR 2 20 78		
F	SEE DCN 1157 (MRL) KR 3-6 78		
G	SEE DCN 1865 (MRL) KR 5-17-78		
J	SEE DCN 2162-1605 (MRL) KR 8-15-78		
M	SEE DCN 2349 2368 KR 11-13-78		

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	PER DCN 0158		
		B	SEE DCN 0272		
		C	PER DCN 0351		
		D	PER DCN 2391		

CONTROL MON MODULE J6

J1-B (MIC IN)
J1-C (SHLD)
J1-18 (SYCE CH OUT)
J1-19 (SHLD)
TB1-7B (UNREG -28 VDC)
TB1-1B (+15 VDC)
TB1-3B (-15 VDC)
TB1-4B (-28 VDC)
J12-B, J2-1 (XMTR PWR)
TB1-5B (GND)
J12-C, J2-2 (SYNTH)
J12-M, J3-1 (CARR DEV)
J12-N, J2-3 (AFC ERR)
J12-L, J1-1 (AUD CH1 CARR)
J12-S, J1-2 (AUD CH1 DEV)
J12-R, J1-5 (AUD CH2 DEV)
J1-3 (TEST TONE OUT)
J12-A, J2-11 (RF STDBY)
TB1-8B (FAIL ALM BUS)
J12-U (FAIL RELAY-W)
J12-V (FAIL RELAY-N.O.)
J12-T (AUX CONTR)
STRAP TO PIN 10
J7 (BSBD IN)
J7 (SHLD)
J1-12 } (AUD CH1 OUT)
J1-13 }
J1-15 } (AUD CH2 OUT)
J1-16 }
J1-17 }
J1-A2 (BSBD OUT)
J1-A2 (SHLD)
J9-A } (AUD CH1 IN)
J9-B }
J9-C }
J10-A } (AUD CH2 IN)
J10-B }
J10-C }
(KEY)

BSBD IN J7
J6-K
J6-L

J14
J1-A1
J1-A1
AUX / 70 MHZ IN

OFF AIR MON J8
J3 A3
J3-A3

AUD CH1 IN J9
A WHT J6-X
B BLK J6-Y
C BLK/WHT J6-Z

AUD CH2 IN J10
A WHT J6-AA
B BLK J6-BB
C BLK/WHT J6-CC

REMOTE MON OUT J12
A (NC)
B YEL J6-3 (XMTR PWR)
C YEL J6-4 (SYNTH)
D GRN TB1-8B (FAIL ALM BUS)
E GRY TB1-7B (UNREG -28 VDC)
F RED TB1-1B (+15 VDC)
G ORN TB1-2B (+5 VDC)
H GRN TB1-3B (-15 VDC)
J BLU TB1-4B (-28 VDC)
K BLK TB1-5B (GND)
L YEL J6-14 (AUD CH1 CARR)
M YEL J6-12 (CARR DEV)
N YEL J6-13 (AFC ERR)
P YEL J6-15 (AUD CH1 DEV)
R YEL J6-17 (AUD CH2 DEV)
S YEL J6-16 (AUD CH2 CARR)
T WHT/NO J6-25 (AUX CONTR)
U WHT J6-23 (FAIL RLY-W.)
V WHT J6-24 (FAIL RLY-N.O.)

RF MODULE J2
A1 J1-A3 (BSBD IN)
J1-A3 (SHLD)
A2 J4-A3 (SYNTH OSC IN)
J4-A3 (SHLD)
1 YEL J6-9 (XMTR PWR MON)
2 YEL J6-11 (SYNTH MON)
3 YEL J6-13 (AFC ERR MON)
4
5
6 RED TB1-1B (+15 VDC)
7 ORN TB1-2B (+5 VDC)
8 GRN TB1-3B (-15 VDC)
9 BLU TB1-4B (-28 VDC)
10 BLK TB1-5B (GND)
11 VIO J6-21 (RF STANDBY)
12
13
14
15 WHT/GRN J6-20 (METER RTN)
16
17
18
19 WHT J3-19 (AFC IN)
20 BLK } STRAP TO PIN 10
21 BLK }
22 BRN TB1-8B (FAIL ALM BUS)
A3 J3-A2 (70 MHZ AFC OUT)
J3-A2 (SHLD)

(FAN OPTION) J16
3 —
2 — GRY TB1-7 (UNREG -28VDC)
1 | BLK TB1-5 (GND)

AFC MODULE J3
A1
A2 J2-A3 (70MHZ AFC IN)
J2-A3 (SHLD)
1 YEL J6-12 (CARR DEV MON)
2
3
4
5
6 RED TB1-1B (+15 VDC)
7 ORN TB1-2B (+5 VDC)
8 GRN TB1-3B (-15 VDC)
9 BLU TB1-4B (-28 VDC)
10 BLK TB1-5B (GND)
11
12
13
14
15
16
17
18
19 WHT J2-19 (AFC OUT)
20 BLK } STRAP TO PIN 10
21 BLK }
22 BRN TB1-8B (FAIL ALM BUS)
A3 J8 (OFF AIR MON)
J8 (SHLD)

SYNTH MODULE J4
A1
A2
1
2
3
4
5
6 RED TB1-1B (+15 VDC)
7 ORN TB1-2B (+5 VDC)
8 GRN TB1-3B (-15 VDC)
9 BLU TB1-4B (-28 VDC)
10 BLK TB1-5B (GND)
11
12
13
14
15
16
17
18
19
20 BLK } STRAP TO PIN 10
21 BLK }
22 BRN TB1-8B (FAIL ALM BUS)
A3 J2-A2 (SYNTH OSC OUT)
J2-A2 (SHLD)

BSBD MODULE J1
A1 J14 (AUX/70 MHZ IN)
J14 (SHLD)
A2 J6-V (BSBD IN)
J6-W (SHLD)
1 YEL J6-14 (AUD CH1 CARR)
2 YEL J6-16 (AUD CH2 CARR)
3 WHT J6-18 (TEST TN IN)
4 YEL J6-15 (AUD CH1 DEV)
5 YEL J6-17 (AUD CH2 DEV)
6 RED TB1-1B (+15 VDC)
7 ORN TB1-2B (+5 VDC)
8 GRN TB1-3B (-15 VDC)
9 BLU TB1-4B (-28 VDC)
10 BLK TB1-5B (GND)
11
12 WHT J6-M } (AUD CH1 IN)
13 BLK J6-N }
14 BLK/WHT J6-P }
15 WHT J6-R } (AUD CH2 IN)
16 BLK J6-S }
17 BLK/WHT J6-T }
18 J6-3 (SYCE CH IN)
19 BLK J6-4 (SHLD)
20 BLK } STRAP TO PIN 10
21 BLK }
22 BRN TB1-8B (FAIL ALM BUS)
A3 J2-A1 (BSBD OUT)
J2-A1 (SHLD)

PWR SUPPLY MODULE J5
A1
A2
1 WHT/BLK FL1-D (H-AC IN)
2 WHT/ORN FL1-E (L-AC IN)
3 W/BLU J13-D ("-" DC IN)
4 W/BLU J13-D ("-" DC IN)
5 GRY TB1-7A (UNREG -28 VDC)
6 RED TB1-1A (+15 VDC)
7 ORN TB1-2A (+5 VDC)
8 GRN TB1-3A (-15 VDC)
9 BLU TB1-4A (-28 VDC)
10 BLK TB1-5A (GND)
11
12 WHT/GRN FL1-B (GND-AC IN)
13 W/RED J13-E ("+" DC IN)
14 W/RED J13-E ("+" DC IN)
15
16 RED TB1-1A (+15 VDC)
17 ORN TB1-2A (+5 VDC)
18 GRN TB1-3A (-15 VDC)
19 BLU TB1-4A (-28 VDC)
20 BLK TB1-5A (GND)
21 BLK TB1-5A (GND)
22 BRN TB1-8A (FAIL ALM BUS)
A3

SYCE CH PATCH J15
A GRY
B WHT
C BLK
D

SYCE CH IN J11
A
B N.C.
C J6-1 (MIC IN)
D J6-2 (SHLD)
BLU TB1-4B (-28V)

AC/DC POWER IN J13
A
B
C
D
E
FL1 A D WHT/BLK J5-1 (H AC IN)
B
C E WHT/ORN J5-2 (L-AC IN)
W/BLU J5-3 ("-" DC IN)
W/BLU J5-4 ("-" DC IN)
W/RED J5-13 ("+" DC IN)
W/RED J5-14 ("+" DC IN)
WHT/GRN J5-12 (GND-AC/DC POWER)

NOTE: CAPACITOR LEADS TO BE SLEEVED CAP LEADS TRIMMED TO .7" SLEEVES CUT TO .5"

TB1
J1-6, J2-6, J3-6, J4-6, J6-6, J12-F (+5 VDC) RED J5-6, J5-16
J4-7, J12-G, J3-7, J1-7, J2-7 (+5 VDC) ORN J5-17, J5-7
J1-8, J2-8, J3-8, J4-8, J6-7, J12-H (-15 VDC) GRN J5-8, J5-18
J1-9, J2-9, J3-9, J4-9, J6-8, J11-D, J12-J (-28 VDC) BLU J5-9, J15-19
J1-10, J2-10, J3-10, J4-10, J6-10, J12-K (GND) BLK J16-1, J5-10, J5-20, J5-21
TB1-GND
J6-5, J12-E (UNREG -28 VDC) GRY J16-2, J5-5
J1-22, J2-22, J3-22, J4-22, J6-22, J12-D (FAIL ALM BUS) BRN J5-22

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY
	TCMG-4000 SERIES	

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	STOCK NO.
REQD PER ASSY					137-0161

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE		
RELIABILITY		
ENGRG	TOM COE	
DESIGN		
CHECK		
DRAFT	JUDY SILBERBERG	12-8-78

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

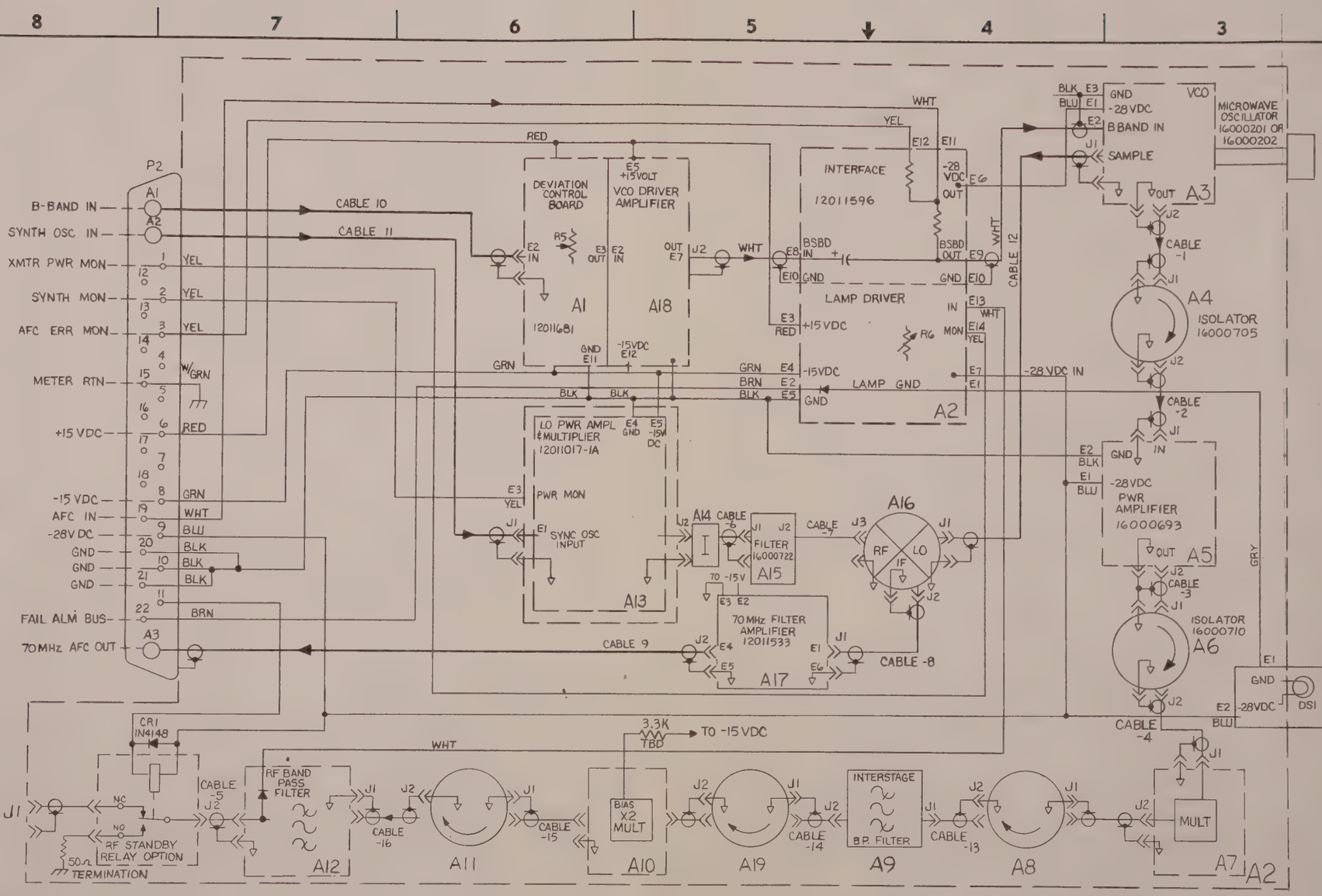
TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

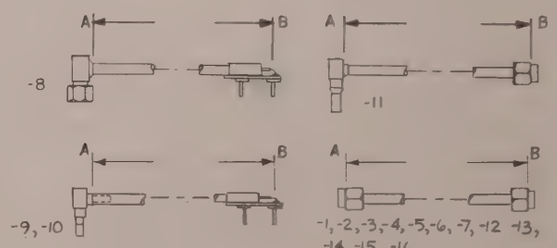
WIRING HARNESS
XMTR WEB ASSY

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12011640	#2

SCALE — SHEET 1 OF 1

12011640 #2





REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	SEE DCN 2612 R. STILES 4-16-80	4/23/80	D. Peterson
		A-1	SEE DCN 2850 D BROWN 8/6-80	9/11/80	M. Johnson

-17						
-16	A11J2	A12J1	UT141	OSM-201-1A	OSM-201-1A	3.16
-15	A10J2	A11J1	UT141	OSM-201-1A	OSM-201-1A	3.16
-14	A9J2	A10J1	UT141	OSM-201-1A	OSM-201-1A	4.66
-13	A8J2	A9J1	UT141	OSM-201-1A	OSM-201-1A	4.16
-12	A3J1	A16J1	UT085	OSM-201-2A	OSM 201-2A	3.310
-11	P2A2	A12J1	RG187/U	DM53741-5001	OSM-501-3	4.1
-10	P2A1	A1J1	RG187/U	DM53741-5001	TCM12011038	4.0
-9	P2A3	A17J2	RG187/U	DM53741-5001	TCM12011038	13.2
-8	A16J2	A17J1	RG187/U	OSM-521-3	TCM 12011038	6
-7	A15J2	A16J3	UT085	OSM-201-2A	OSM-201-2A	7.16
-6	A14J2	A15J1	UT085	OSM-201-2A	OSM-201-2A	4.16
-5	A12J2	J1	UT141	OSM-201-1A	OSM-201-1A	2.56
-4	A6J2	A7J1	UT141	OSM-201-1A	OSM-201-1A	4.16
-3	A5J2	A6J1	UT141	OSM-201-1A	OSM-201-1A	4.16
-2	A4J2	A5J1	UT085	OSM-201-2A	OSM-201-2A	3.310
-1	A3J2	A4J1	UT141	OSM-201-1A	OSM-201-1A	4.660
CBL ASSY	FROM	TO	COAX TYPE	CONNECTOR A	CONNECTOR B	CABLE LENGTH

TABLE I

XMTR RF	STRAP PAD	U-LINK PAD
601	OUT, E7-E8	IN, E9-E11
602	IN, E5-E6	IN, E9-E11
603	OUT, E7-E8	OUT, E9-E10
603 w/AMPL	IN, E5-E6	IN, E9-E11
604	OUT, E7-E8	OUT, E9-E10
604 w/AMPL	IN, E5-E6	IN, E9-E11
606	OUT, E7-E8	IN, E9-E11
608	OUT, E7-E8	IN, E9-E11

2. SEE TABLE I FOR SETTINGS OF THE STRAPS AND U-LINKS ON THE DEVIATION CONTROL BOARD.
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION
REQD PER ASSY				

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR XX ± .03 XXX ± .010 HOLES PER AND10087
ANGULAR ± 0° 30'
ALL MACHINED SURFACES
FINISH

CONTRACT NUMBER

RELEASE		
RELIABILITY		
ENGRG	L. JANSSEN	2-11-75
DESIGN		
CHECK		
DRAFT	J. Wilkins	2-7-75

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

WIRING DIAGRAM — XMTR RF MODULE (1000 SERIES)

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12011642	A1

SCALE NONE | SHEET 1 OF 1

CONIC FORM 1984

12011642 A1

B1-0327

PROPRIETARY RIGHTS
are involved in the subject matter of this material and all manufacturing reproduction use and sales rights pertaining to such matter are expressly reserved. It is submitted in confidence for a specified purpose and the recipient, by accepting this material agrees that this material will not be used, copied or reproduced in whole or in part, nor its contents revealed in any manner, or to any person, except for the purposes delivered

*SEE SHEET 1 OF 12011643/12511693

D	SEE DCN 2311 2R.10.1179	
D1	SEE DCN 2773 PB 6780	1/7/80
D2	SEE DCN 4340 BC 4-23-81	4/29/81

REVISIONS

EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		Δ	SEE DCN 0176	7 2 75	
		B	SEE DCN 0216	8 28 75	JSB
		-	SEE DCN 0239	9.24.75	A.M.B
		-	SEE DCN 0281	2-1-76	AMB
		C	SEE DCN 03 B JRS-B	6 [illegible]	[illegible]
		C1	SEE DCN 0490 JRB	3-15-77	JRB
		C2	SEE DCN 0494 NC	4-25-77	[illegible]
		-3	SEE DCN C-618 (TAPE CHG) JRB	5-24-77	[illegible]
		C4	DCN 0760 (MRL CHG ONLY) KR 1-19-78		[illegible]
		C5	DCN 0871 (MRL) CHG ONLY KR 2-7-78	2-7-78	[illegible]
		C6	DCN 1159 (MRL) KR 3-6-78	3-6-78	[illegible]
		C7	DCN 1188 & 1198 KR 3-16-78	[illegible]	[illegible]
		C8	DCN 1635 (MRL) KR 9-6-78	[illegible]	[illegible]

Cont. *

P6 pin assignments:

SPARE	19	
AUD CH2 DEV	17	
AUD CH2 CARR	16	
AUD CH1 DEV	15	
AUD CH1 CARR	14	
AFC ERR	13	
CARR DEV	12	
SYNTH	11	
XMTR POWER	9	
-28V	8	
-15V	7	
+15V	6	
GND	10	
METER RETURN	20	
FAIL RELAY-N.O.	24	
FAIL RELAY-W	23	
AUX CONTR	25	
	A	
FAIL ALM BUS	22	
UNREG-28V	5	
	B	
	C	
	D	
MIC IN	I	
	2	
TEST TONE	18	
	E	
	21	
	F	
	H	
	J	
SVCE CH OUT	3	
	4	
	K	
BSBD IN	L	
	V	
BSBD OUT	W	
	AA	
AUD CH2 IN	BB	
	CC	
	R	
AUD CH2 OUT	S	
	T	
	X	
AUD CH1 IN	Y	
	Z	
	M	
AUD CH1 OUT	N	
	P	
	U	

0-100 μA

R1 5K, R2 2K; CR1 HPA 5082-2800, CR2 HPA 5082-2800

B BLK, E2 ORN, A RED, E1 VIOL, E5, E6 BRN, E7 GRY, E8 W/YEL, E9 W/BLK, E10 W/RED, E11 W/ORN, E12 YEL, E13 WHT, E14 BLU, E15 GRN, E16 RED, E4 BLK, E3 W/GRN, E28, E25, E26, E27, C, D BRN, GRY

R3, R4, R5 50K, R6 1K, R7 1K, R8 25K, R9 50K, R10 1K, R11 1K, R12 25K, R13 50K, R14 20K, R15 2K, R16 25K, R17 5K, R18 1K, R19 100, R20 10K, R21 430K, R22 220K, R23 220K

-15V, GND, +15V, E29 ORN, R24 1.8K 1W, CR3 IN4002, CR5 IN4002, CR4 IN4002, DS1 ALARM (RED), R25 560 1W

(OPTIONAL) FAIL RELAY K1 12010211 (NORMALLY ENERGIZED)

R26 1.5K 1/2W, C1 15MF 20V, R27 360

CR6 IN4002, JUMPER E17–E18 (STANDBY OPT)

SW2 (3) RF ON, (2) STANDBY, (1); K BLK, E VIO, H BRN

SW1 (3) ON, (8) DEV TEST, (7) OFF; M BLK, P WHT

R28 240, BSBD E33, E34 U-LINK, CH1 E30, CH2 E32, E31, R32 75Ω, R31 75Ω, S WHT/GRN (2) (1) (5) (4), BB IN, BB OUT, T VIO

WHT

BSBD ATTEN 75 OHM UNBAL 12011046

ORN, RED, BLU, YEL

R29 2.7K, R30 2.7K

TEST TONE OSC (OPTIONAL) 12011534: +15V, -15V, MUTE IN, GND, R13

MUTE, NC, GND, T OUT

REAR VIEW OF S2. KEYWAY FACES TOWARD TOP.

REAR VIEW OF S1 KEYWAY FACES TOWARD BOTTOM

REAR, FRONT

FRONT VIEW

SW 3 SWITCH POSITIONS
1. TRANSIT
2. +15V
3. -15V
4. -28V
5. XMTR POWER
6. SYNTH
7. CARR DEV
8. AFC ERR
9. AUD CH1 CARR
10. AUD CH1 DEV
11. AUD CH2 CARR
12. AUD CH2 DEV

PIN 1

REAR VIEW OF SW3 KEYWAY OF SWITCH FACES TOWARD BOTTOM

SWITCH 125-0028

CONTROL MONITOR BD: K BLK, E VIO

TO OUTPUT (E10) OF VIDEO SYNC DETECTOR BOARD (12011630)

(REAR VIEW OF OPTIONAL S2)

TO BE USED WITH VIDEO PRESENCE DETECTOR BD.

B BAND ATTEN | CONTR/MON (XMTR) | AUD CH1 ATTEN | AUD CH 2

RF ON AUTO OFF; ALM; DEV TST ON OFF

VIDEO PRESENCE DETECTOR BD 12011630 (OPTIONAL): E3, E4, E1 GRN -15V, E10 W/VIO TO PIN 4 OF S2

RF ON AUTO OFF

THIS SWITCH IS USED FOR VIDEO PRESENCE DETECTOR OPTION

AT 2 0-10DB: BLU, ORN, YEL, RED — AUD CH1 ATTEN 600 OHM BAL, 150 OHM BAL, 75 OHM UNBAL 12011046

AT 3 0-10DB: BLU, ORN, YEL, RED — AUD CH2 ATTEN 12011042, 12011

WHT FROM PIN 1, WAFER A OF BSBD ATTENUATOR JUMPER

BB OUT; WHT, BLK, VIO, WHT/GRN, BRN; P, M, T, S, H

REAR VIEW OF WIRES TO S-1 (125-0001)

2. ALL RESISTORS ARE 1/4W, 5%, VALUES ARE IN OHMS
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	STOCK NO.
REQD PER ASSY					

730-5107

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03, .XXX ± .010; ANGULAR ± 0° 30'
HOLES PER AND10387
ALL MACHINED SURFACES
FINISH

CONTRACT NUMBER

RELEASE		11-4-76
RELIABILITY		
ENGRG	TOM COE	
DESIGN		
CHECK		
DRAFT	D PEARSON	8-30-76

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

WIRING DIAGRAM —
CONTROL MONITOR MODULE (XMTR)

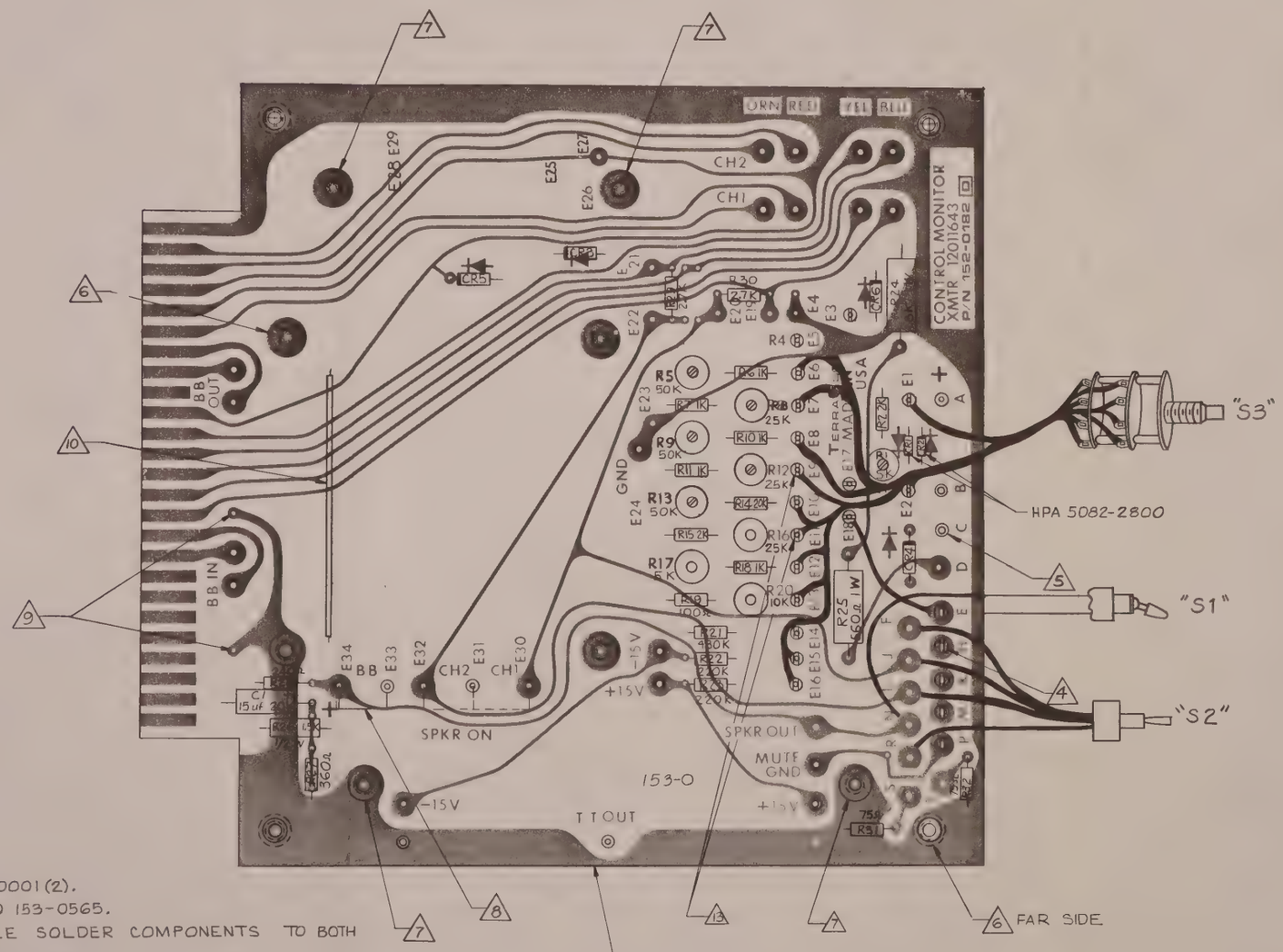
SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12011643	D-2

SCALE —
SHEET 8 OF

12011643 D2

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED

COMPONENT SIDE 1



13. TURRET TERM 119-0001(2).
12. P.C. BOARD PART NO 153-0565.
11. WHEREVER POSSIBLE SOLDER COMPONENTS TO BOTH SIDES OF BOARD.
10. JUMPER WIRE #22 BUS WIRE TEFLON TUBING.
9. INTERFACIAL FEE THRU HOLE INSERT 22 BUS WIRE SOLDER TO BOTH SIDES(2 PL).
8. U-LINK IS CAMBION #461-3771-01-03-16(TCM #119-0022) 1 REQD.
7. THREADED STANDOFF #4-40 x.250 DIA x .125 LONG ARE CAMBION #350-1300-09-07(TCM #119-0089) 4 REQD.
6. THREADED STANDOFF #4-40 x.250 DIA x .250 LONG ARE CAMBION #350-1300-11-07(TCM #119-0090) 8 REQD.
5. SOCKETS ARE CAMBION #450-3704-01-03(TCM #119-0007) 29 REQD.
4. BIFURCATED TERMINALS ARE LERCO #50-62 (TCM #119-0009) 22 REQD.
3. ALL DIODES ARE IN4002 EXCEPT CR1&CR2.
2. ALL RESISTORS ARE 1/4 W, 5% VALUES IN OHMS.
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

SHT	DRAWING	SIZE
10		
9		
8	SCHEMATIC	
7	DRILL OVERLAY	D
6	ASSEMBLY OVERLAY	D
5	SOLDER MASK	D
4	ARTWORK (SIDE 2)	D
3	ARTWORK (SIDE 1)	D
2	DRILL DRAWING	C
1	ASSEMBLY DRAWING	C

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE

LIST OF MATERIAL

REQD PER ASSY

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR XX ± .01 XXX ± 005
ANGULAR ± 0° 30'
HOLES PER AND10387
ALL MACHINED SURFACES
FINISH

CONTRACT NUMBER

RELEASE	
RELIABILITY	
ENGRG	
DESIGN	
CHECK	
DRAFT	M.CASTILLO 11-18-82

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA A LORAL SUBSIDIARY

ASSEMBLY DRAWING
CONTROL MONITOR
TRANSMITTER

SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO	LTR
D	15895	12011643		D-2

SCALE 2:1 SHEET 1 OF

12011643 B4

PRECISION PHOTOGRAPHY INCORPORATED (714) 578-4000

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	REVERSED POS. OF LOW PASS FILTER AND STRAP ATTENUATOR BD8. SEE DCN 0217	8-2-76	
		B	REVERSED CALL-OUTS "B7" & "B8" PER WBC DCN 0438	2/17/77	JRB
		C	ADDED "XMTR WITH C-OPTION" TO TITLE PER DCN CAG 2 WBC	5/4/77	JRB
		D	SEE DCN 0958(MRL) KR 2-1578	2 MAY	

SIDE 1

SIDE 2

S1 — BSBD / AUDIO 1 / AUDIO 2 / REPEATER (OPTIONAL CIRCUITRY)

(DCM-25W3-P) P1

AUX IN — A1 NC
BSBD IN — A2
AUD CH1 CARR — 1 YEL
AUD CH1 IN — 12 WHT
AUD CH2 CARR — 2 YEL
AUD CH1 IN — 13 BLK
TEST TONE IN — 3 WHT
GND — 14 W/BLK
AUD CH1 DEV — 4 W/YEL
AUD CH2 IN — 15 WHT
AUD CH2 DEV — 5 W/YEL
AUD CH2 IN — 16 BLK
+15 VDC — 6 RED
GND — 17 W/BLK
SVCE CH IN — 18 NC 7
-15 VDC — 8 GRN
GND — 19 9 NC
GND — 20 BLK
GND — 21 BLK 10
11 NC
22 NC A3

B1 — 12011010 INV-NON-INV AMP IN

B2 — 12011058 SUBCARR MOD (OPTIONAL) IN

B3 — 12011058 SUB CARR MOD
⚠1 (OPTIONAL) OR 12011616 C-PILOT OSC (OPT)

B4 — VARIABLE AMPLITUDE EQUALIZER 12011054 (OPTIONAL)

B5 — 12011692 SUMMING NETWORK

B6 — 12011023 OR 12011024 PRE-EMPHASIS (OPTIONAL) IN

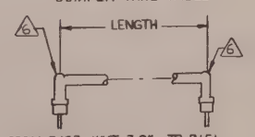
B7 — STRAP ATTENUATOR (12011573)

B8 ⚠2 — LOW PASS ELLIPTICAL OR LOW PASS BUTTERWORTH (12011032) (OPTIONAL) C IN

RG 187/U

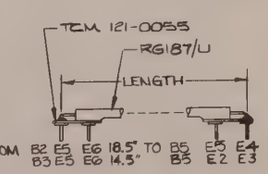
B BAND (XMTR) TT SEL/REP
AUD 1 AUD 2 BB REP
FRONT PANEL

JUMPER WIRE TABLE

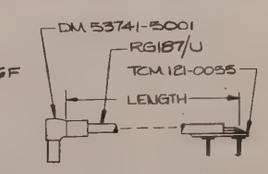


FROM B4E7 WHT 3.0" TO B1E1
B4E8 BLK 3.0" TO B1E21

COAX CABLE TABLES



FROM B2 E5 E6 18.5" TO B5 E5 E4
B3 E5 E6 14.5" B5 E2 E3



FROM P1A3 6.5" TO B1E15 E14
P1A2 12.5" TO B8E4 E1

⚠ FOR USE OF C-PILOT OSC FOR B3, SEE TABLE A.

⚠6 CONNECTORS ON JUMPER WIRES ARE MADE FROM FEED-THRU TERMINAL SELECTRO 011-1004-00-0-479, AND 1/8" DIA HEAT SHRINK TUBE .6" LONG.

⚠5 STRAP E18 TO E19 ON B1, AND E19 TO E20 ON B5.

4 WIRES FROM P1 12,13,14, AND P1 15,16,17 ARE SHIELDED TWISTED PAIRS P/N. 1100-GGF

3 WIRES ARE 22 AWG TEFLON WITH CONNECTOR ON ENDS MADE FROM TEFLON SOCKETS CAMBION 450-4352-01-03-19 AND 1/8 DIA HEAT SHRINK TUBE .6" LONG.

⚠4 ELLIPTICAL FILTER SHOWN, BUTTERWORTH FILTER OCCUPIES ONLY HALF OF WIDTH.

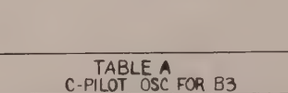
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

"U" LINK	FROM — TO
RED 119-0033 (0.4")	B4 E1 — B5 E6
	B5 E1 — B6 E4
	B6 E1 — B7 E11
	B7 E1 — B8 E2
BLACK 119-0032 (0.4")	B4 E14 — B5 E7
	B5 E14 — B6 E5
	B6 E10 — B7 E12
	B7 E20 — B8 E3
BLUE 119-0022 (0.4")	B4 E2 — B4 E14
	B6 E2 — B6 E9
	B6 E3 — B6 E6
	B4 E13 — B4 E15
	B5 E17 — B5 E18
	B1 E8 — B1 E9
	B1 E6 — B1 E7
BLUE 119-0110 (0.2")	B2 E22 — B2 E23 (OPTIONAL)
	B2 E26 — B2 E27 (OPTIONAL)
	B3 E22 — B3 E23 (OPTIONAL)
	B3 E26 — B3 E27 (OPTIONAL)
	B7 — 6 PLCS

TABLE A
C-PILOT OSC FOR B3

1. MOUNT BOARD AT RIGHT HALF OF B3
2. ADD JUMPER WIRE SHOWN BELOW
3. GRN WIRE FROM P1-8 TO B3E6
4. BLK WIRE FROM P1-10 TO B3E5



FROM YEL WIRE FROM P1-2 B3E1

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	STOCK NO.
					137-0119

REQD PER ASSY

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010
ANGULAR ± 0° 30'
HOLES PER AND10387
ALL MACHINED SURFACES
FINISH

CONTRACT NUMBER

RELEASE	Tom Coe	7-10-75
RELIABILITY		
ENGRG	TOM COE	
DESIGN		
CHECK		
DRAFT	J R Sullivan	10-75
DESIGN ACTIVITY APPROVAL		
DESIGN APPROVAL		

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

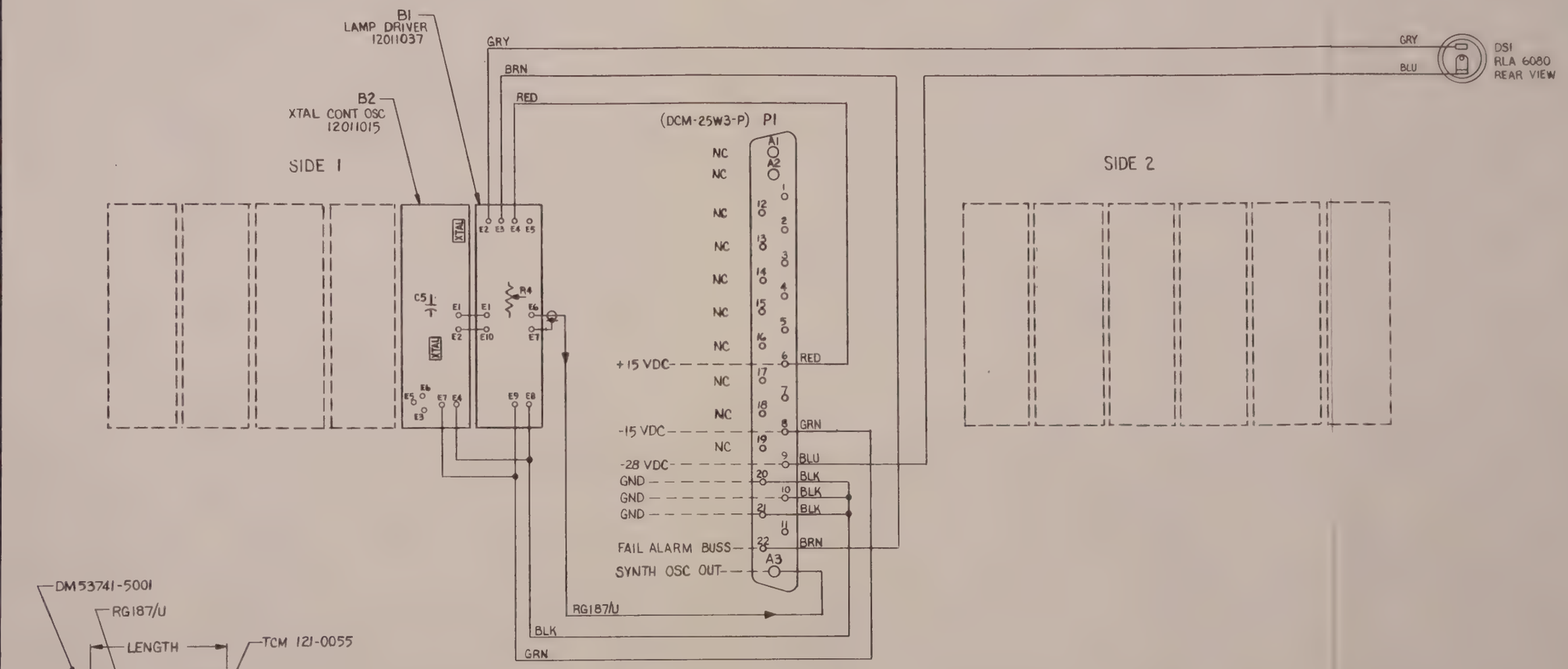
WIRING DIAGRAM-
BASE BAND MODULE,-
XMTR WITH C-PILOT OPTION

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12011644	D

SCALE — SHEET 1 OF 1

12011644 D

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	SEE DCN 0952(MRL) KR 2-16-78	2-20-78	



U-LINK	FROM — TO
BLACK 119-0032 0.4"	B1 E10 — B2 E2
RED 119-0033 0.4"	B1 E1 — B2 E1
BLUE 119-0110 0.2"	B2 E3 — B2 E5

2. WIRES ARE 22 AWG TEFLON WITH CONNECTOR ON ENDS MADE FROM TEFLON SOCKETS CAMBION 450-4352-01-03-19, AND 1/8" DIA. HEAT SHRINK TUBE 0.6" LONG.

1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	137-0259 STOCK NO.
REQD PER ASSY	LIST OF MATERIAL				

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AM010387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	Tom Coe	2-15-78
RELIABILITY		
ENGNG	TOM COE	
DESIGN		
CHECK		
DRAFT	M Wiring	

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

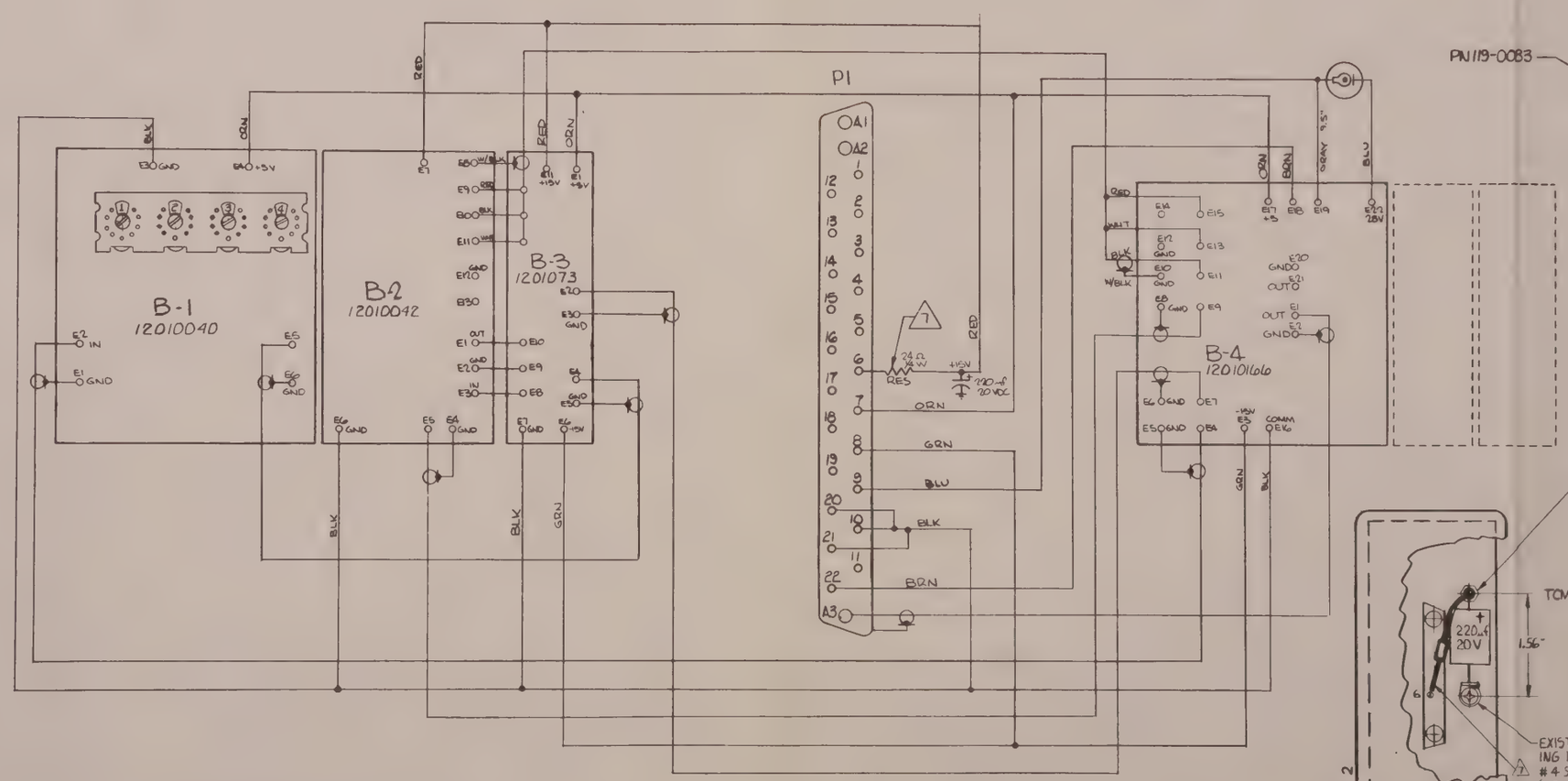
WIRING DIAGRAM
SYNTHESIZER MODULE - XMTR

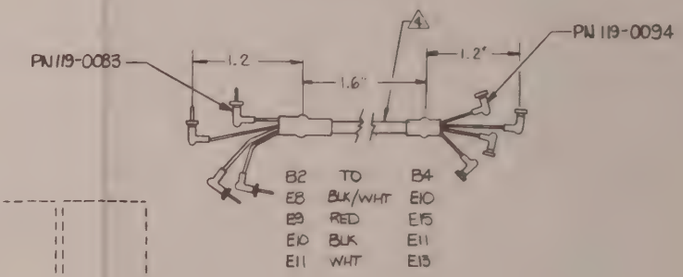
SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12011645	A

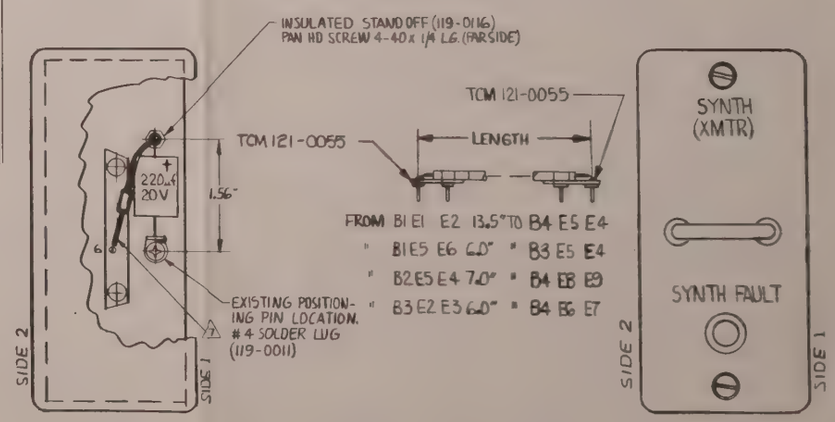
SCALE NONE | SHEET | OF

12011645 A

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	SEE DCN 0213	8-2-75	J. Berger
		B	SEE DCN 0609 MR 8/11/77	7-20-77	[illegible]
		C	SEE DCN 0613 AND 0624 JRB 9-20-77	9-20-77	[illegible]
		C-1	DCN 0758 MRL CHG ONLY KR 1-19-78		[illegible]
		C-2	DCN 0856 MRL CHG ONLY KR 2-8-78	2-9-78	[illegible]
		D	SEE DCN 0956 (MRL) KR 2-15-78	2-16-78	[illegible]
		D-1	SEE DCN 1655 (MRL) KR 9-6-78	9-12-78	[illegible]
		D-2	SEE DCN'S 2988 & 2987 DB 10-2-80	10-2-80	[illegible]
		D 3	SEE DCN 4427 BC 6-17-81	6-26-81	[illegible]

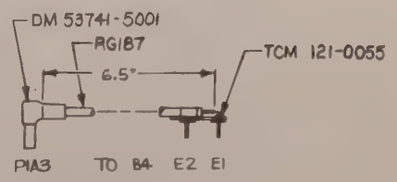






9. FOR SELECTING SINGLE FREQUENCY NUMBERS USING THE SWITCH 125-0149, SEE WIRING HARNESS DRWG. 137-0566-XXX.
8. HARNESS NO. 137-0235.
7. COVER WITH SHRINK TUBING.
6. GREEN WIRES ARE TO BE CUT OFF FLUSH ON BOTH ENDS.
5. GROUND SHIELDS WITH BLK/WHT WIRE.
4. CABLE IS PN 137-0164.
3. CONNECTORS ARE TEFLON SOCKETS PN 119-0094
2. ALL WIRES ARE TELFON AWG 22.
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED



U-LINKS -
RED: B2E1 TO B3E10
B2E3 TO B3E8
BLK: B2E2 TO B3E9

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	STOCK NO.
						130-0135

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .01 .XXX ± .005 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER
RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

WIRING DIAGRAM-
DIGITAL FREQUENCY SYNTHESIZER,
TRANSMITTER MODULE

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12011647	D3

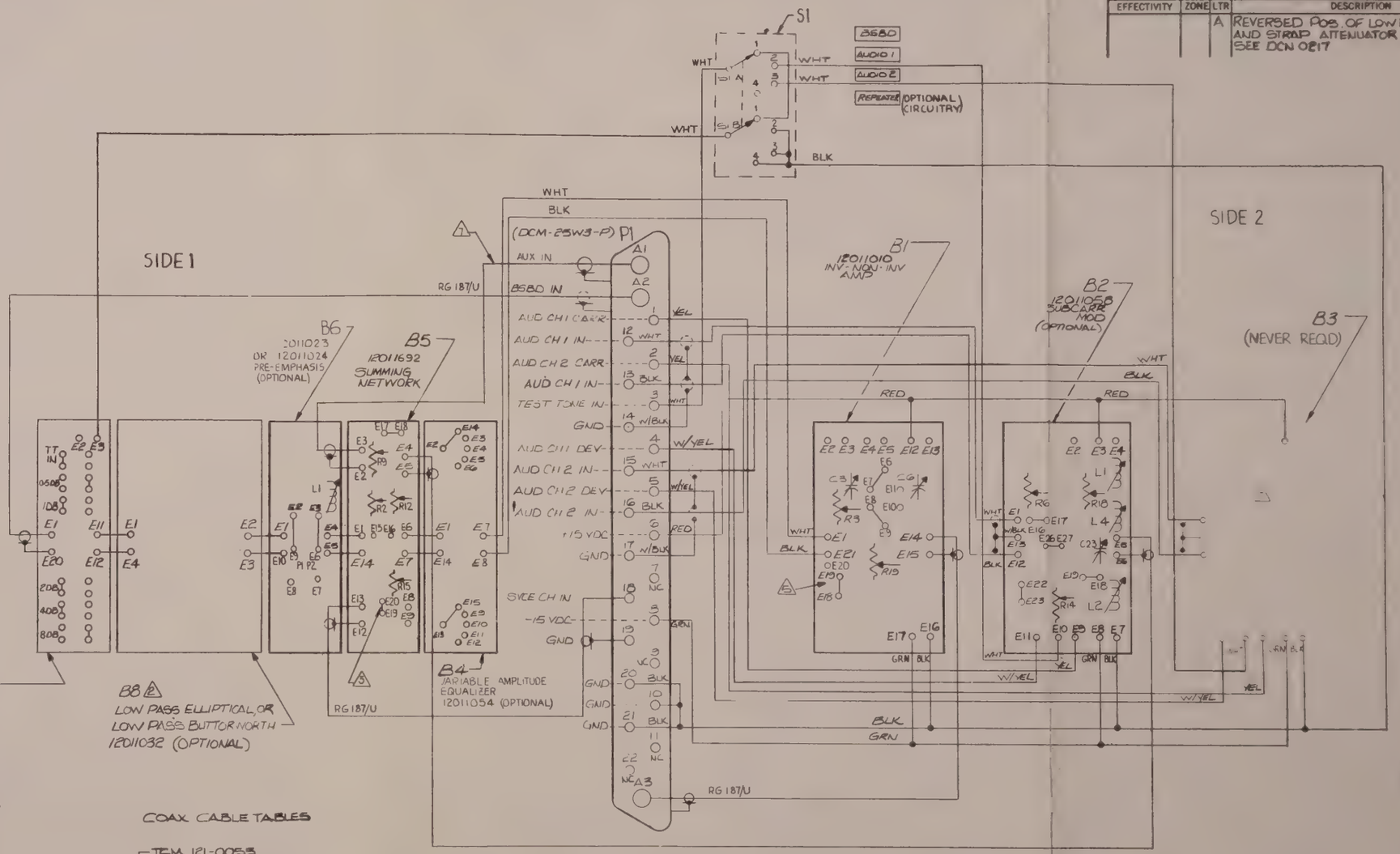
SCALE — SHEET 1 OF 1

QTY REQD	USED ON	NEXT ASSY

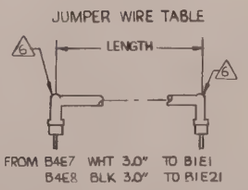
X1=NC

12011647 D3

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	REVERSED POS. OF LOW PASS FILTER AND STRAP ATTENUATOR BDS. SEE DCN 0217	5-8-75	

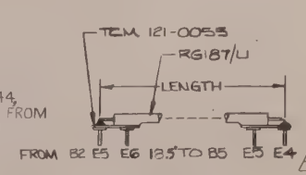


JUMPER WIRE TABLE

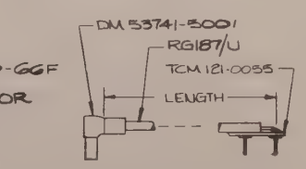


FROM B4E7 WHT 3.0" TO B1E1
B4E8 BLK 3.0" TO B1E21

COAX CABLE TABLES



FROM B2 E5 E6 13.5" TO B5 E5 E4 4



FROM P1A3	6.5"	TO B1E15 E14
P1A2	12.5"	TO B8E4 E1
P1A1	7.3"	TO B5E2 E3 4

1. THIS DRAWING IS IDENTICAL WITH DRAWING NUMBER 12011644, EXCEPT CABLE FROM P1A1 TO B5E3 IS ADDED, CABLE FROM B3E5 TO B5E3 IS REMOVED, AND B3 IS NOT INCLUDED
2. CONNECTORS ON JUMPER WIRES ARE MADE FROM FEED-THRU TERMINAL SELECTRO 011-1004-00-0-473, AND 1/8" DIA HEAT SHRINK TUBE .6" LONG.
3. STRAP E18 TO E19 ON B1, AND E19 TO E20 ON B5.
4. 4 WIRES FROM P1 12,13,14, AND P1 15,16,17 ARE SHIELDED TWISTED PAIRS P/N. 1100-GGF
5. 3 WIRES ARE 22 AWG TEFLON WITH CONNECTOR ON ENDS MADE FROM TEFLON SOCKETS CAMBION 425O-4352-01-03-19, AND 1/8 DIA HEAT SHRINK TUBE .6" LONG.
6. ELLIPTICAL FILTER SHOWN, BUTTERWORTH FILTER OCCUPIES ONLY HALF OF WIDTH.

NOTE: UNLESS OTHERWISE SPECIFIED

"U" LINK	FROM — TO
RED 119-0033 (0.4")	B4E1 — B5E6 B5E1 — B6E4 B6E1 — B7E11 B7E1 — B8E2
BLACK 119-0032 (0.4")	B4E14 — B5E7 B5E14 — B6E5 B6E10 — B7E12 B7E20 — B8E3
BLUE 119-0022 (0.4")	B4E2 — B4E14 B6E2 — B6E9 B6E3 — B6E6 B4E13 — B4E15 B5E17 — B5E18 B1E8 — B1E9 B1E6 — B1E7
BLUE 119-0110 (0.2")	B2E22 — B2E23 (OPTIONAL) B2E26 — B2E27 (OPTIONAL) B7 — 6 PLCS

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	REQD PER ASSY

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED	CONTRACT NUMBER
DIMENSIONS ARE IN INCHES	
TOLERANCES	
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387	ANGULAR ± 0° 30'
ALL MACHINED SURFACES	√
FINISH	

RELEASE	Tom Cox	2-16-75
RELIABILITY		
ENGRG	TOM COE	
DESIGN		
CHECK		
DRAFT		

DESIGN ACTIVITY APPROVAL

DESIGN APPROVAL

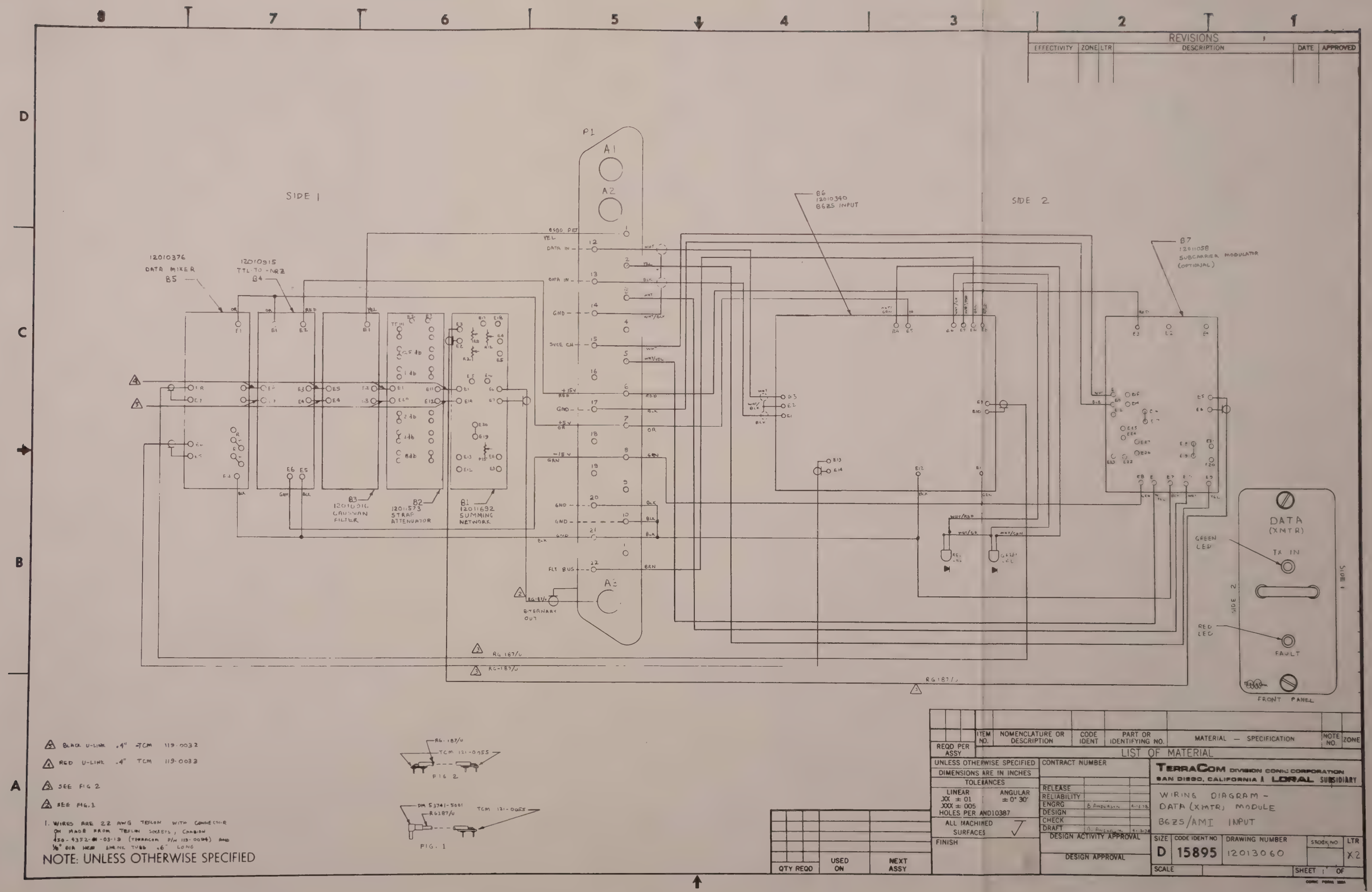
TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

WIRING DIAGRAM-
B BSD MODULE WITH AUX INPUT
OPTION (ONE OR NO SUBCARR - XMTR

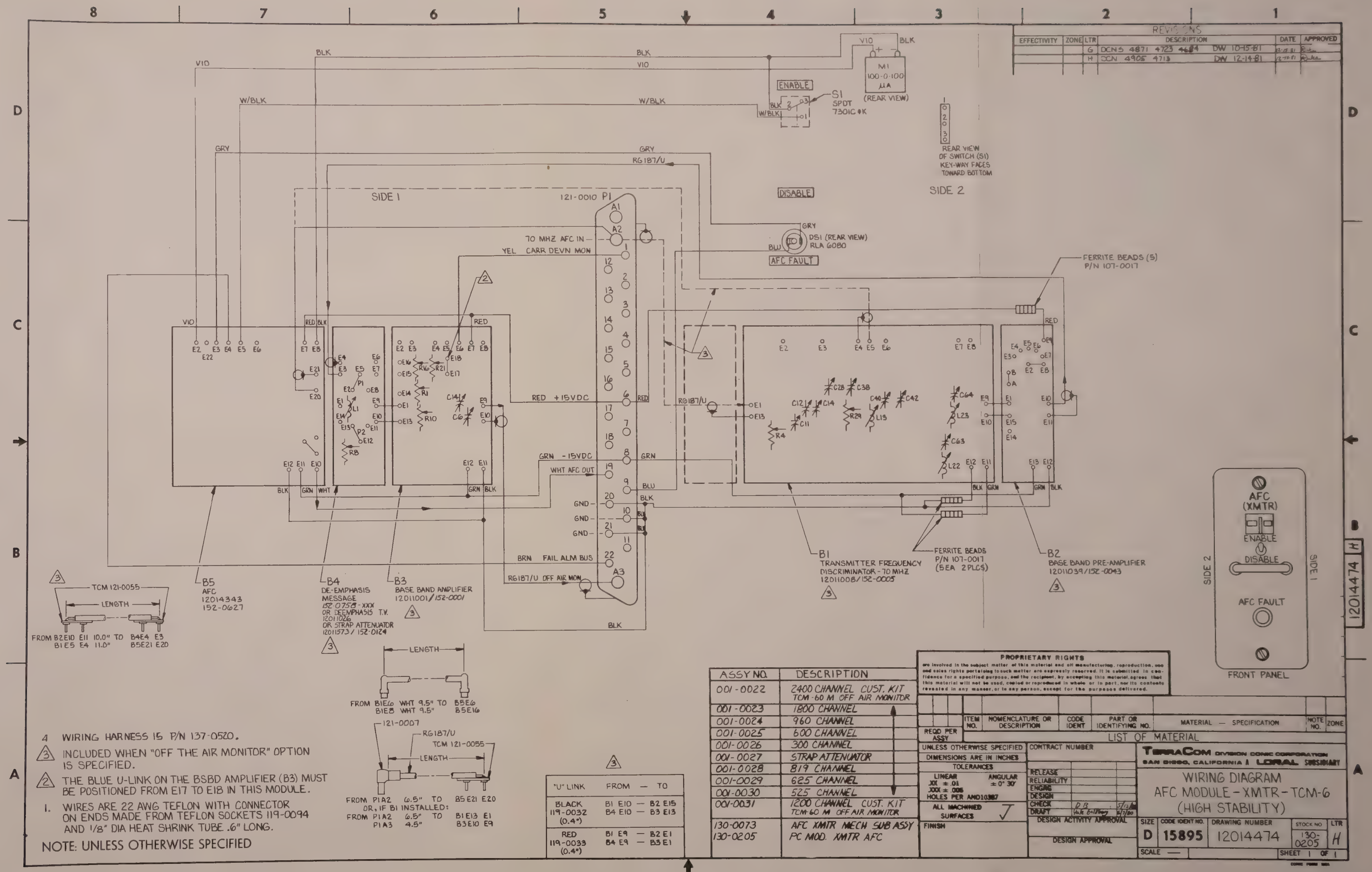
SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12011648	A

SCALE | SHEET 1 OF 1

37-0328



REVISIONS
EFFECTIVITY
ZONE
LTR
DESCRIPTION
DATE
APPROVED
SIDE 1
SIDE 2
P1
A1
A2
A3
12010376
DATA MIXER
B5
12010915
TTL-TO-NRZ
B4
B3
12010916
GAUSSIAN
FILTER
B2
12011573
STRAP
ATTENUATOR
B1
12011692
SUMMING
NETWORK
B6
12010340
B6ZS INPUT
B7
12011058
SUBCARRIER MODULATOR
(OPTIONAL)
DATA
(XMTR)
TX IN
GREEN
LED
RED
LED
FAULT
FRONT PANEL
BITERNARY
OUT
RG 187/U
BLACK U-LINK .4" TCM 119-0032
RED U-LINK .4" TCM 119-0033
SEE FIG 2
SEE FIG. 1
1. WIRES ARE 22 AWG TEFLON WITH CONNECTOR ON MADE FROM TEFLON SOCKETS, CHABION 450-4352-01-03-19 (TERRACOM P/N 119-0094) AND 1/8" DIA HEAT SHRINK TUBE .6" LONG
NOTE: UNLESS OTHERWISE SPECIFIED
FIG 2
FIG. 1
ITEM NO.
NOMENCLATURE OR DESCRIPTION
CODE IDENT
PART OR IDENTIFYING NO.
MATERIAL — SPECIFICATION
NOTE NO.
ZONE
REQD PER ASSY
LIST OF MATERIAL
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR
.XX ± .01
.XXX ± .005
HOLES PER AND10387
ANGULAR
± 0° 30'
ALL MACHINED SURFACES
FINISH
CONTRACT NUMBER
RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL
TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA A LORAL SUBSIDIARY
WIRING DIAGRAM -
DATA (XMTR) MODULE
B6ZS/AMI INPUT
SIZE
D
CODE IDENT NO
15895
DRAWING NUMBER
12013060
STOCK NO
LTR
X2
SCALE
SHEET 1 OF
QTY REQD
USED ON
NEXT ASSY



4 WIRING HARNESS IS P/N 137-0520.

3 INCLUDED WHEN "OFF THE AIR MONITOR" OPTION IS SPECIFIED.

2 THE BLUE U-LINK ON THE BSBD AMPLIFIER (B3) MUST BE POSITIONED FROM E17 TO E18 IN THIS MODULE.

1. WIRES ARE 22 AWG TEFLON WITH CONNECTOR ON ENDS MADE FROM TEFLON SOCKETS 119-0094 AND 1/8" DIA HEAT SHRINK TUBE .6" LONG.

NOTE: UNLESS OTHERWISE SPECIFIED

"U" LINK	FROM — TO
BLACK 119-0032 (0.4")	B1 E10 — B2 E15 B4 E10 — B3 E13
RED 119-0033 (0.4")	B1 E9 — B2 E1 B4 E9 — B3 E1

ASSY NO.	DESCRIPTION
001-0022	2400 CHANNEL CUST. KIT TCM-60 M OFF AIR MONITOR
001-0023	1800 CHANNEL
001-0024	960 CHANNEL
001-0025	600 CHANNEL
001-0026	300 CHANNEL
001-0027	STRAP ATTENUATOR
001-0028	819 CHANNEL
001-0029	625 CHANNEL
001-0030	525 CHANNEL
001-0031	1200 CHANNEL CUST. KIT TCM-60 M OFF AIR MONITOR
130-0073 130-0205	AFC XMTR MECH SUB ASSY PC MOD. XMTR AFC

PROPRIETARY RIGHTS
are involved in the subject matter of this material and all manufacturing, reproduction, use and sales rights pertaining to such matter are expressly reserved. It is submitted in confidence for a specified purpose, and the recipient, by accepting this material, agrees that this material will not be used, copied or reproduced in whole or in part, nor its contents revealed in any manner, or to any person, except for the purposes delivered.

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .01 .XXX ± .005 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES
FINISH

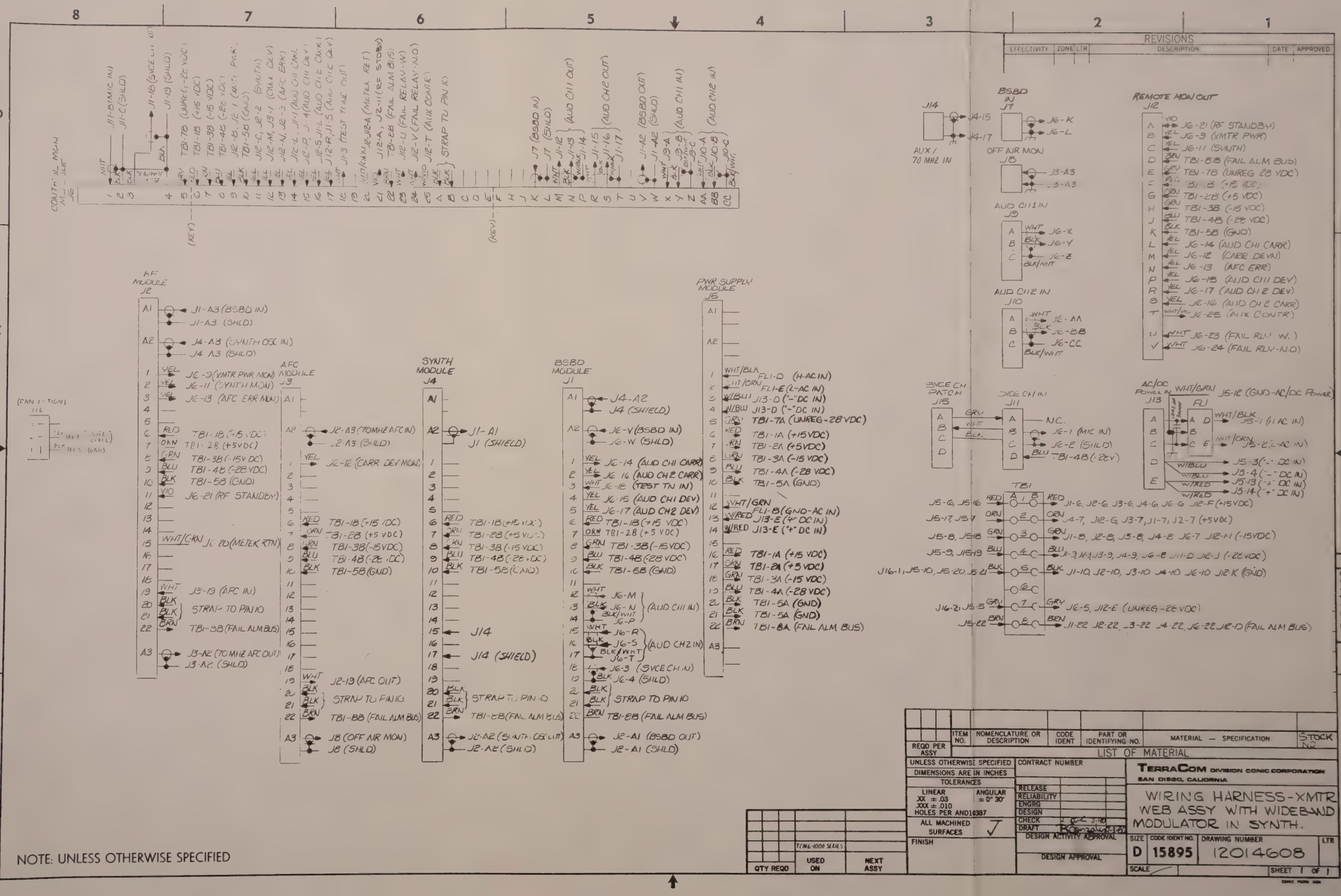
CONTRACT NUMBER
RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK D.B. 5/12/80
DRAFT Yale Goldberg 5/7/80
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

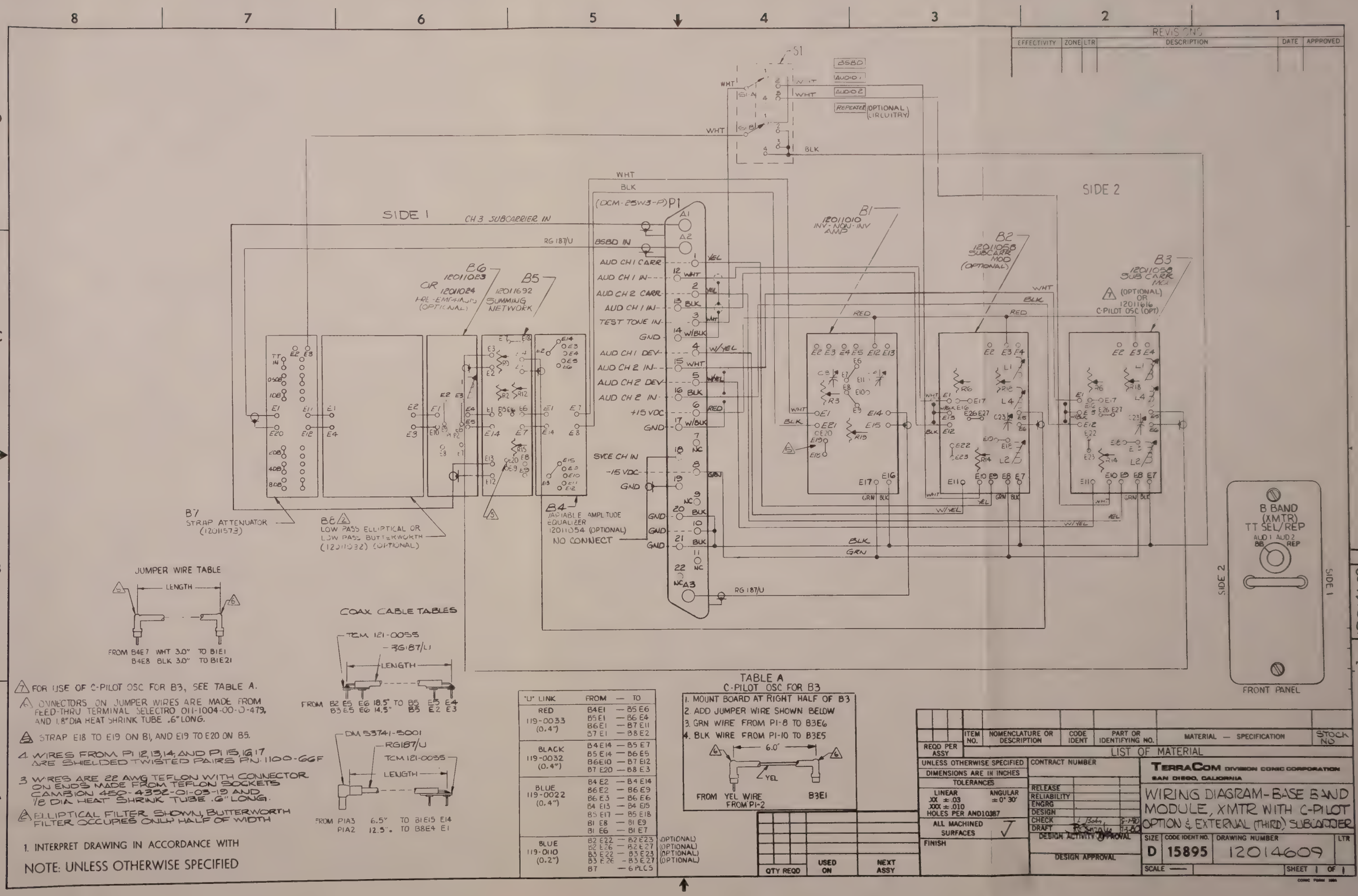
TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA A LORAL SUBSIDIARY

WIRING DIAGRAM
AFC MODULE - XMTR - TCM-6
(HIGH STABILITY)

SIZE	CODE IDENT NO.	DRAWING NUMBER	STOCK NO	LTR
D	15895	12014474	130-0205	H

SCALE — SHEET 1 OF 1


REVISIONS
EFFECTIVITY | ZONE | LTR | DESCRIPTION | DATE | APPROVED
CONTROL MON J6
J1-B (MIC IN)
J1-C (SHLD)
J1-16 (SVCE CH IN)
J1-19 (SHLD)
TBI-7B (UNREG +28 VDC)
TBI-1B (+15 VDC)
TBI-3B (-15 VDC)
TBI-4B (-28 VDC)
J1-E, J2-1 (XMTR PWR)
TBI-5B (GND)
J1-C, J2-2 (SYNTH)
J1-M, J3-1 (CMN DEV)
J1-N, J2-3 (AFC ERR)
J1-L, J1-1 (AUD CH1 CMN)
J1-P, J1-4 (AUD CH1 DEV)
J1-S, J1-2 (AUD CH2 CMN)
J1-R, J1-5 (AUD CH2 DEV)
J1-3 (TEST TONE OUT)
J1-A, J2-11 (RF STDBY)
TBI-6B (FAIL ALM BUS)
J1-U (FAIL RELAY-W)
J1-V (FAIL RELAY-NO)
J1-T (AUX CONTR)
STRAP TO PIN K
J7 (BSBD IN)
J7 (SHLD)
J1-12
J1-13 (AUD CH1 OUT)
J1-14
J1-15
J1-16 (AUD CH2 OUT)
J1-17
J1-A2 (BSBD OUT)
J1-A2 (SHLD)
J9-A
J9-B (AUD CH1 IN)
J9-C
J10-A
J10-B (AUD CH2 IN)
J10-C
(KEY)
J14
J4-15
J4-17
AUX / 70 MHZ IN
BSBD IN J7
J6-K
J6-L
OFF AIR MON J8
J8-A3
J8-A3
AUD CH1 IN J9
J6-X
J6-Y
J6-Z
BLK/WHT
AUD CH2 IN J10
J6-AA
J6-BB
J6-CC
BLK/WHT
REMOTE MON OUT J12
J6-21 (RF STANDBY)
J6-9 (XMTR PWR)
J6-11 (SYNTH)
TBI-8B (FAIL ALM BUS)
TBI-7B (UNREG 28 VDC)
TBI-1B (+15 VDC)
TBI-2B (+5 VDC)
TBI-3B (-15 VDC)
TBI-4B (-28 VDC)
TBI-5B (GND)
J6-14 (AUD CH1 CARR)
J6-12 (CARR DEV)
J6-13 (AFC ERR)
J6-15 (AUD CH1 DEV)
J6-17 (AUD CH2 DEV)
J6-16 (AUD CH2 CARR)
J6-22 (AUX CONTR)
J6-23 (FAIL RLY W.)
J6-24 (FAIL RLY N.O)
AF MODULE J2
J1-A3 (BSBD IN)
J1-A3 (SHLD)
J4-A3 (SYNTH OSC IN)
J4-A3 (SHLD)
J6-9 (XMTR PWR MON)
J6-11 (SYNTH MON)
J6-13 (AFC ERR MON)
TBI-1B (+15 VDC)
TBI-2B (+5 VDC)
TBI-3B (-15 VDC)
TBI-4B (-28 VDC)
TBI-5B (GND)
J6-21 (RF STANDBY)
J6-20 (METEK RTN)
J3-13 (AFC IN)
STRAP TO PIN 10
TBI-5B (FAIL ALM BUS)
J3-A2 (70 MHZ AFC OUT)
J3-A2 (SHLD)
AFC MODULE J3
J2-A3 (70MHZ AFC IN)
J2-A3 (SHLD)
J6-16 (CARR DEV MON)
TBI-1B (+15 VDC)
TBI-2B (+5 VDC)
TBI-3B (-15 VDC)
TBI-4B (-28 VDC)
TBI-5B (GND)
J2-13 (AFC OUT)
STRAP TO PIN 10
TBI-8B (FAIL ALM BUS)
J8 (OFF AIR MON)
J8 (SHLD)
SYNTH MODULE J4
J1-A1
J1 (SHIELD)
J14
J14 (SHIELD)
TBI-1B (+15 VDC)
TBI-2B (+5 VDC)
TBI-3B (-15 VDC)
TBI-4B (-28 VDC)
TBI-5B (GND)
STRAP TO PIN 10
TBI-8B (FAIL ALM BUS)
J2-A2 (SYNTH OSC OUT)
J2-A2 (SHLD)
BSBD MODULE J1
J4-A2
J4 (SHIELD)
J6-V (BSBD IN)
J6-W (SHLD)
J6-14 (AUD CH1 CARR)
J6-16 (AUD CH2 CARR)
J6-12 (TEST TN IN)
J6-15 (AUD CH1 DEV)
J6-17 (AUD CH2 DEV)
TBI-1B (+15 VDC)
TBI-2B (+5 VDC)
TBI-3B (-15 VDC)
TBI-4B (-28 VDC)
TBI-5B (GND)
J6-M
J6-N
J6-P
(AUD CH1 IN)
J6-R
J6-S
J6-T
(AUD CH2 IN)
J6-3 (SVCE CH IN)
J6-4 (SHLD)
STRAP TO PIN 10
TBI-8B (FAIL ALM BUS)
J2-A1 (BSBD OUT)
J2-A1 (SHLD)
PWR SUPPLY MODULE J5
FLI-D (H-AC IN)
FLI-E (L-AC IN)
J13-D ("-" DC IN)
J13-D ("-" DC IN)
TBI-7A (UNREG-28 VDC)
TBI-1A (+15 VDC)
TBI-2A (+5 VDC)
TBI-3A (-15 VDC)
TBI-4A (-28 VDC)
TBI-5A (GND)
FLI-B (GND-AC IN)
J13-E ("+" DC IN)
J13-E ("+" DC IN)
TBI-1A (+15 VDC)
TBI-2A (+5 VDC)
TBI-3A (-15 VDC)
TBI-4A (-28 VDC)
TBI-5A (GND)
TBI-5A (GND)
TBI-8A (FAIL ALM BUS)
SVCE CH PATCH J15
SVCE CH IN J11
N.C.
J6-1 (MIC IN)
J6-2 (SHLD)
TBI-4B (-28V)
AC/DC POWER IN J13
J5-12 (GND-AC/DC POWER)
FLI
WHT/BLK J5-1 (L AC IN)
WHT/ORN J5-2 (L-AC IN)
J5-3 ("-" DC IN)
J5-4 ("-" DC IN)
J5-13 ("+" DC IN)
J5-14 ("+" DC IN)
TBI
J5-6, J5-16 RED J1-6, J2-6, J3-6, J4-6, J6-6, J12-F (+15VDC)
J5-17, J5-7 ORN J4-7, J12-G, J3-7, J1-7, J2-7 (+5VDC)
J5-8, J5-18 GRN J1-8, J2-8, J3-8, J4-8, J6-7, J12-H (-15VDC)
J5-9, J5-19 BLU J1-3, J2-3, J3-9, J4-9, J6-8, J11-D, J12-J (-28VDC)
J16-1, J5-10, J5-20, J5-21 BLK J1-10, J2-10, J3-10, J4-10, J6-10, J12-K (GND)
J16-2, J5-5 GRY J6-5, J12-E (UNREG-28VDC)
J5-22 BRN J1-22, J2-22, J3-22, J4-22, J6-22, J12-D (FAIL ALM BUS)
NOTE: UNLESS OTHERWISE SPECIFIED
ITEM NO. | NOMENCLATURE OR DESCRIPTION | CODE IDENT | PART OR IDENTIFYING NO. | MATERIAL — SPECIFICATION | STOCK NO
REQD PER ASSY
LIST OF MATERIAL
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010
ANGULAR ± 0° 30'
HOLES PER AND16387
ALL MACHINED SURFACES
FINISH
CONTRACT NUMBER
RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL
TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA
WIRING HARNESS-XMTR WEB ASSY WITH WIDEBAND MODULATOR IN SYNTH.
SIZE D
CODE IDENT NO. 15895
DRAWING NUMBER 12014608
LTR
SCALE
SHEET 1 OF 1
QTY REQD | USED ON | NEXT ASSY
TONE-1000 SERIES
12014608



7 FOR USE OF C-PILOT OSC FOR B3, SEE TABLE A.

6 CONNECTORS ON JUMPER WIRES ARE MADE FROM FEED-THRU TERMINAL SELECTRO 011-1004-00-0-479, AND 1.8" DIA HEAT SHRINK TUBE .6" LONG.

5 STRAP E18 TO E19 ON B1, AND E19 TO E20 ON B5.

4 WIRES FROM P1 12,13,14, AND P1 15,16,17 ARE SHIELDED TWISTED PAIRS P.N. 1100-66F

3 WIRES ARE 22 AWG TEFLON WITH CONNECTOR ON ENDS MADE FROM TEFLON SOCKETS CAMBION 450-4352-01-03-19 AND 1/8 DIA HEAT SHRINK TUBE .6" LONG.

2 ELLIPTICAL FILTER SHOWN, BUTTERWORTH FILTER OCCUPIES ONLY HALF OF WIDTH

1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

"U" LINK	FROM — TO	
RED 119-0033 (0.4")	B4E1 — B5E6	
	B5E1 — B6E4	
	B6E1 — B7E11	
	B7E1 — B8E2	
BLACK 119-0032 (0.4")	B4E14 — B5E7	
	B5E14 — B6E5	
	B6E10 — B7E12	
	B7E20 — B8E3	
BLUE 119-0022 (0.4")	B4E2 — B4E14	
	B6E2 — B6E9	
	B6E3 — B6E6	
	B4E13 — B4E15	
	B5E17 — B5E18	
	B1E8 — B1E9	
	B1E6 — B1E7	
BLUE 119-0110 (0.2")	B2E22 — B2E23	(OPTIONAL)
	B2E26 — B2E27	(OPTIONAL)
	B3E22 — B3E23	(OPTIONAL)
	B3E26 — B3E27	(OPTIONAL)
	B7 — 6 PLCS	

TABLE A
C-PILOT OSC FOR B3

1. MOUNT BOARD AT RIGHT HALF OF B3
2. ADD JUMPER WIRE SHOWN BELOW
3. GRN WIRE FROM P1-8 TO B3E6
4. BLK WIRE FROM P1-10 TO B3E5

6.0"
YEL
FROM YEL WIRE FROM P1-2
B3E1

QTY REQD	USED ON	NEXT ASSY

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	STOCK NO

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 ANGULAR ± 0° 30'
HOLES PER AND10387
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER
RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK L. Bohn 8-1-80
DRAFT 7-3-80
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

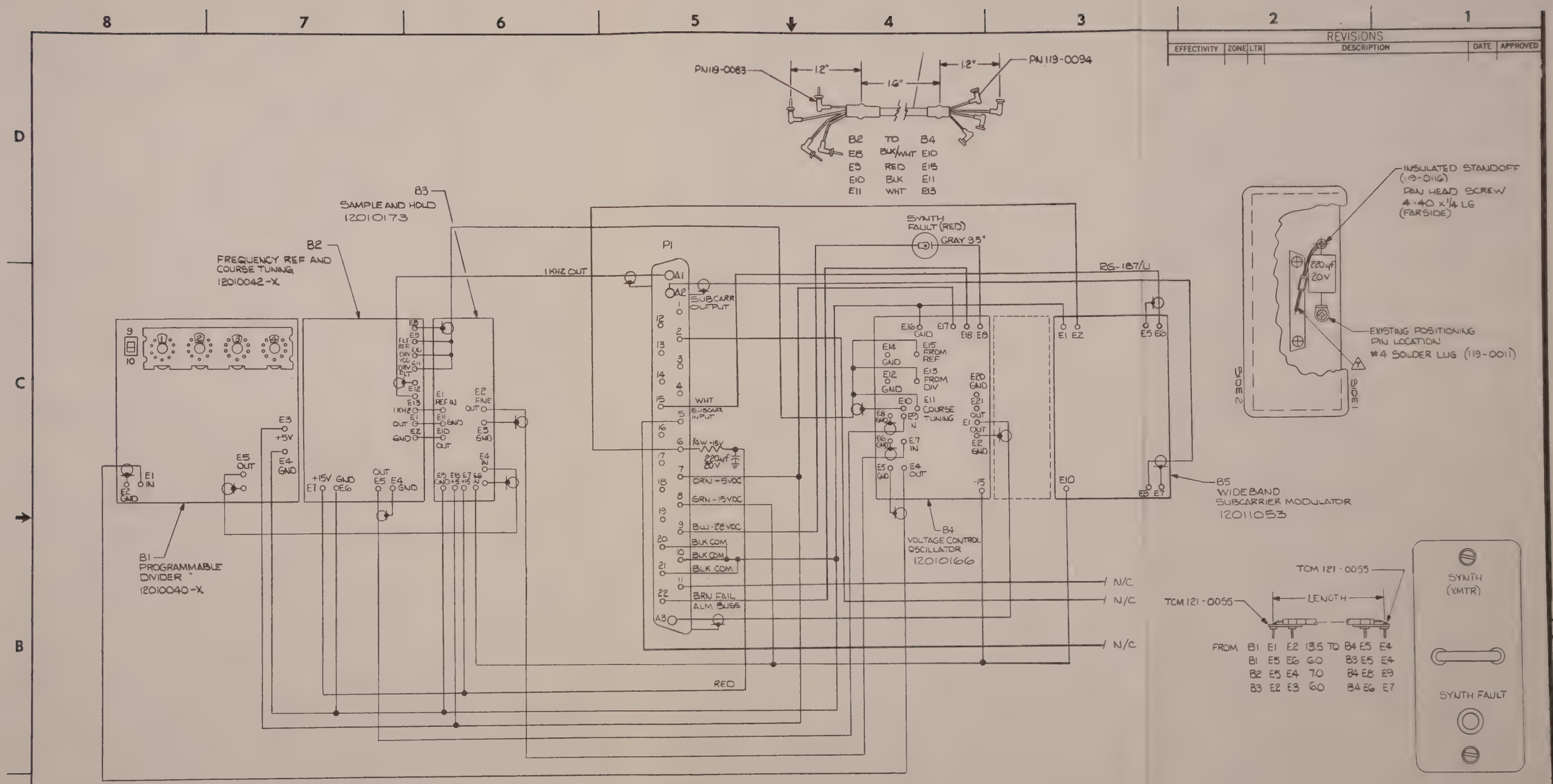
TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

WIRING DIAGRAM-BASE BAND MODULE, XMTR WITH C-PILOT OPTION & EXTERNAL (THIRD) SUBCARRIER

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12014609	

SCALE —
SHEET 1 OF 1

12014609



8 USED IN CONJUNCTION WITH BSBD MODULE WITH REPEATER AND TWO SUBCARRIER 12010087 AND XMTR AND XMTR WEB ASSY WITH SUBCARRIER & DIGITAL SYNTH 12010932.

7 COVER WITH SHRINK TUBING

6. GREEN WIRES ARE TO BE CUT OFF FLUSH ON BOTH ENDS.

5 GROUND SHIELDS WITH BLK/WHT WIRE.

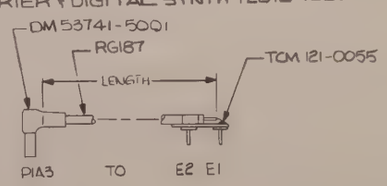
4 CABLE IS PN 137-0164

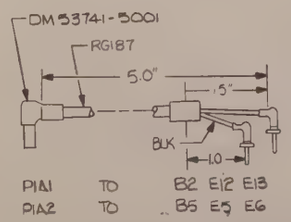
3. CONNECTORS ARE TEFLON SOCKETS PN 137-0164

2. ALL WIRES ARE TEFLON AWG 22.

1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED





REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	STOCK NO.

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .01 .XXX ± .005 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER
RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

WIRING DIAGRAM - DIGITAL FREQUENCY SYNTHESIZER, TRANSMITTER MODULE - WITH WIDEBAND SUBCARRIER OPTION

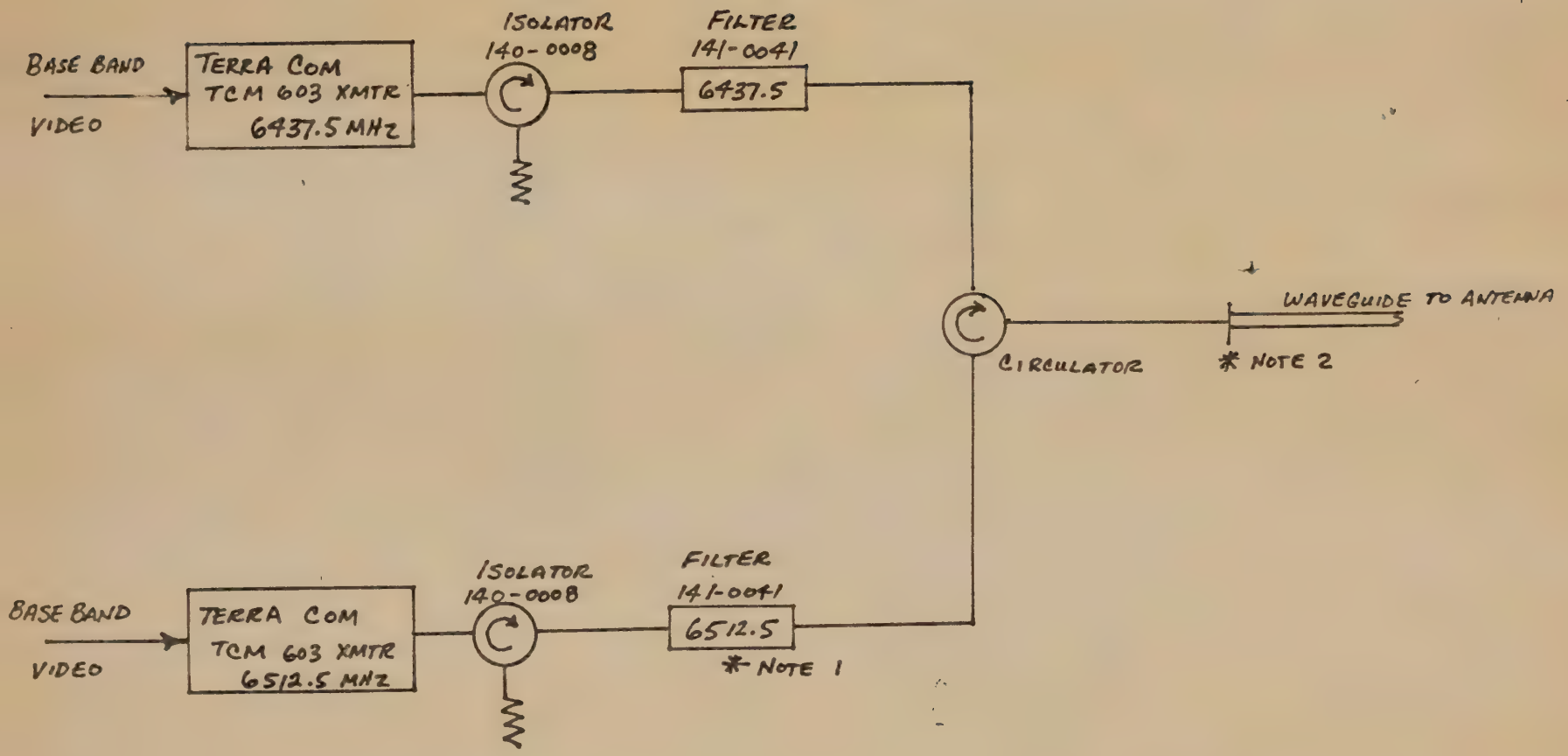
SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12014611	

SCALE — SHEET 1 OF 1

QTY REQD	USED ON	NEXT ASSY

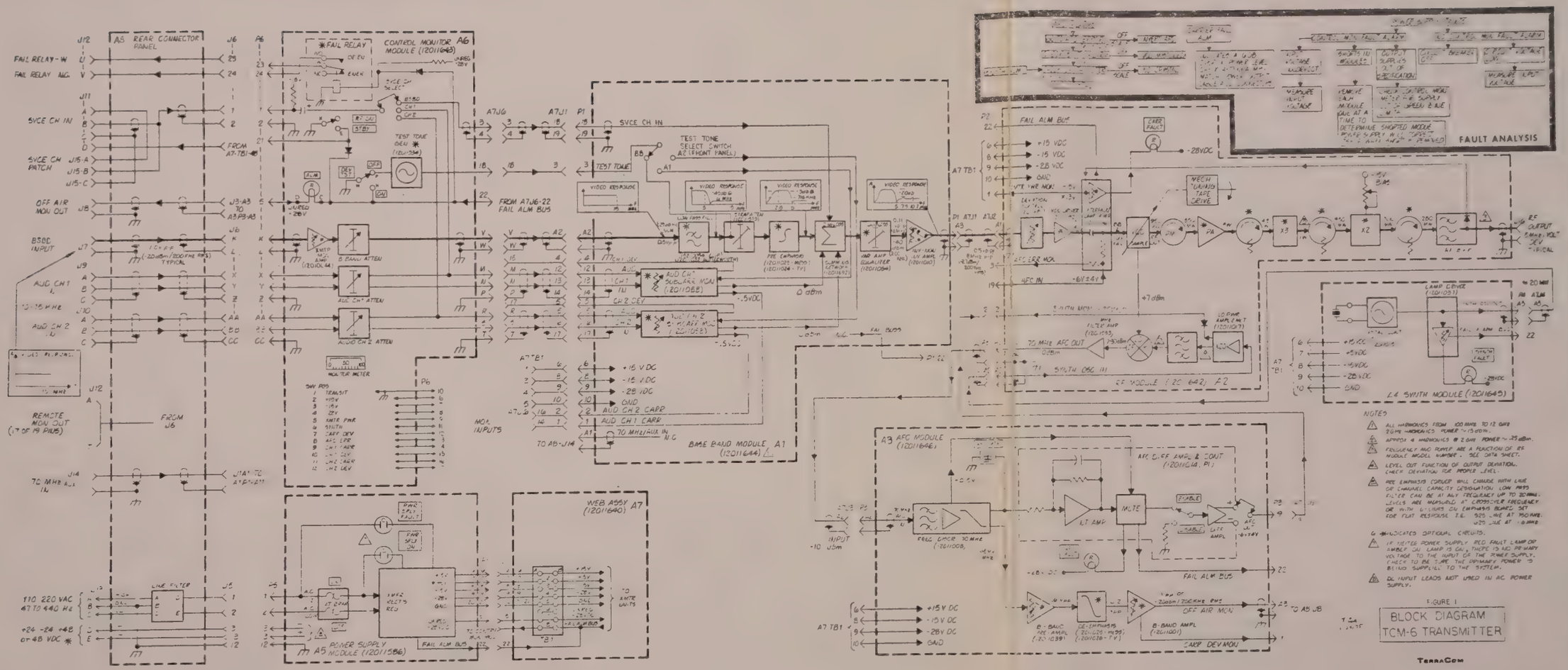
12014611

TYPICAL DUAL-FED ARRANGEMENT
(TWO FREQ. IN LOCAL TV TRANSMISSION BAND)



* NOTES

1. USE OF SECOND FILTER IS OPTIONAL ADDITIONAL ISOLATION MAY BE REQUIRED.



XMTR - BLOCK DIG.

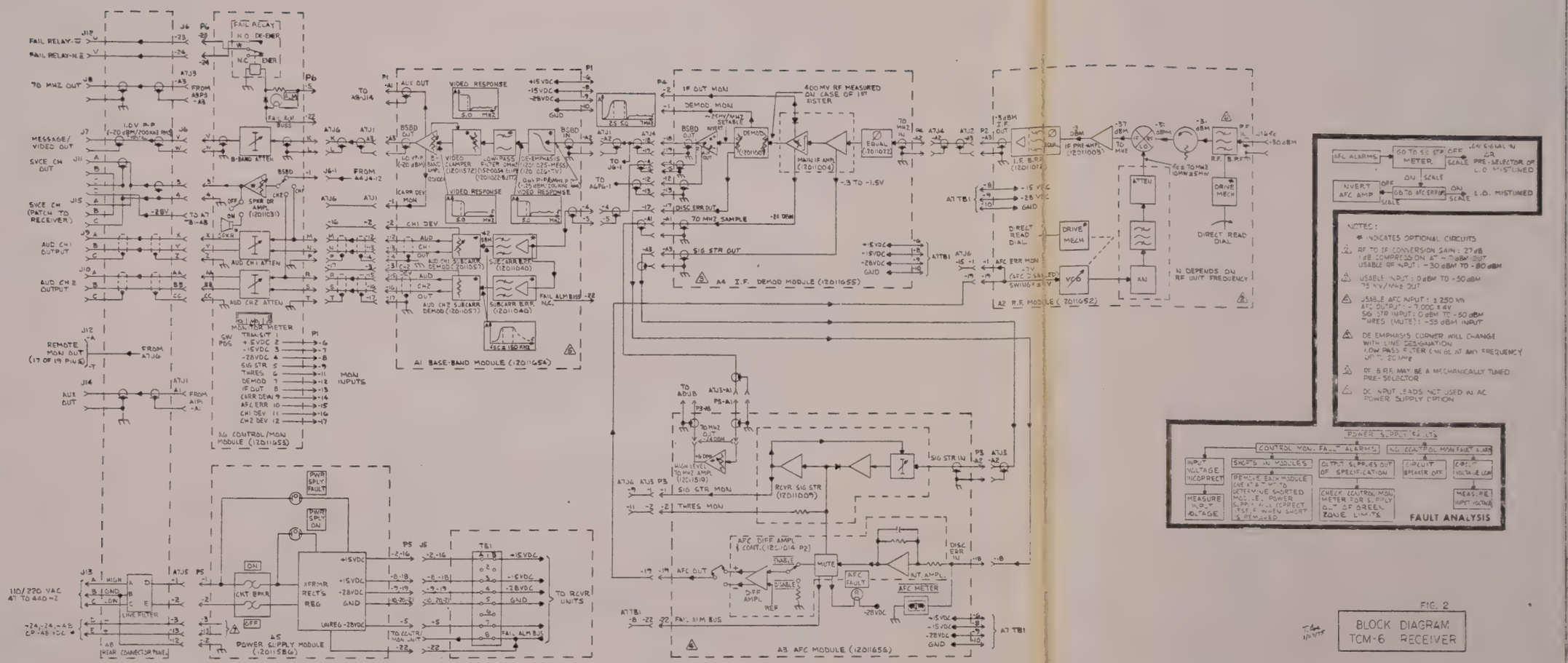


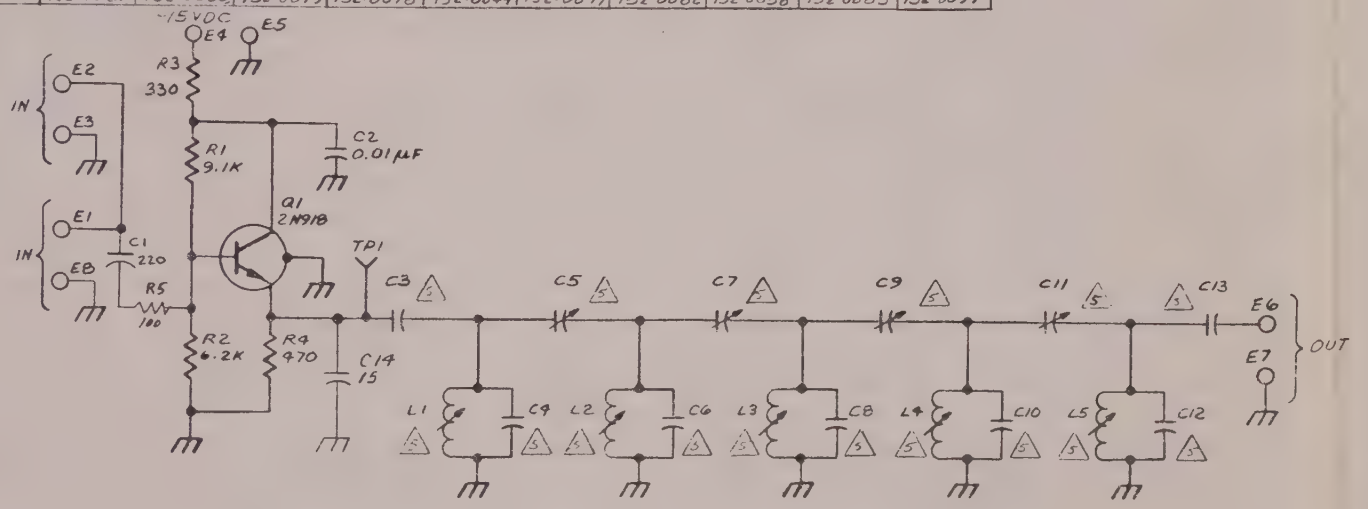
FIG. 2

BLOCK DIAGRAM
TCM-6 RECEIVER

BLOCK DIAGRAM
RECEIVER

COMPONENT	FREQUENCY (MH_2)									
	4.8	5.8	6.5	6.8	7.5	8.5	10.5	12	14	0.5
L1, L5	3.3	3.3	3.3	3.3	3.3	3.3	1.5 VAR	.75 VAR	.75 VAR	1.5 VAR
L2, L3, L4	6.8	6.8	6.8	6.8	6.8	6.8	2.2 VAR	1.5 VAR	1.5 VAR	2.2 VAR
C3	160	120	62	62	62	62	43	33	33	47
C4	330	220	130	130	100	82	180	250	180	180
C5, 7, 9 & 11	6-22 VAR	6-22 VAR	3-9 VAR	3-9 VAR	3-9 VAR	3-9 VAR	3-9 VAR	3-9 VAR	3-9 VAR	3-9 VAR
C6, C10	160	120	75	75	68	56	130	130	82	130
C8	160	120	82	82	68	56	130	120	82	130
C12	330	220	120	120	120	82	180	250	180	180
C13	100	100	47	47	47	47	47	47	47	47
PC ASSY NO.	152-0081	152-0080	152-0079	152-0078	152-0084	152-0077	152-0082	152-0058	152-0083	152-0097

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	ALL RESISTORS WERE 1/8 WATTS ±1%	6-3-72	
		B	NOTES 5 ADDED		
		C	C1 WAS 15. C14 15PF ADDED	9-4-72	
	—	—	VALUE CHANGES. SEE DCN 0011	92073	



5 FOR COMPONENT VALUE SEE CHART.
4. INDUCTORS ARE IN MICROHENRIES.
3. CAPACITOR VALUES ARE IN PICOFARADS.
2. ALL RESISTORS ARE IN OHMS ±5%, 1/4 W.
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY
	TCM-6A	

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE
REQD PER ASSY						

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC
SUBCARRIER B.P.F.

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011040	C

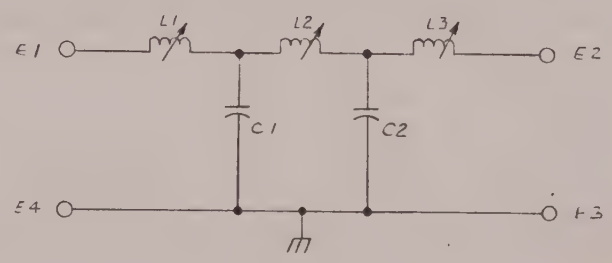
SCALE NONE | SHEET 1 OF 1

CONIC FORM 1974

12011040 C

Subcarrier B. P. F.

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	PER ARTWORK CHANGE		
		B	ARTWORK CHANGE		



COMPONENT	CUTOFF FREQUENCY				
	4 MHz	6 MHz	8 MHz		
L1 L3 ⚠4	1.5 μH	1.0 μH	0.75 μH		
L2 ⚠4	4.7 μH	3.3 μH	2.2 μH		
C1 & C2	560 PF	430 PF	360 PF		

⚠4 COILS WOUND ON T37-IC CORE
3 COILS ARE IN MICROHENRIES
2 CAPACITORS ARE IN PICOFARADS
1. INTERPRET DRAWING IN ACCORDANCE WITH
NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE
REQD PER ASSY						

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR XX ± .03 XXX ± .010 ANGULAR ± 0° 30'
HOLES PER AND10387
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER
RELEASE
RELIABILITY
ENGR
DESIGN
CHK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CA

SCHEMATIC
LOW PASS FILTER —
BUTTERWORTH

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011032	B

SCALE NONE SHEET 1 OF 1

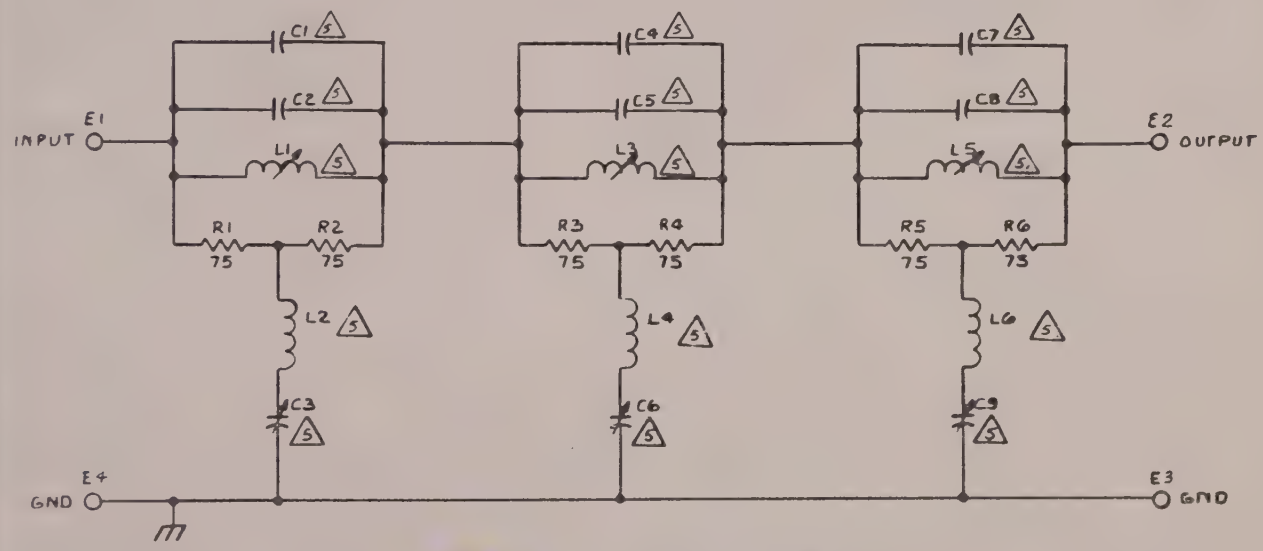
COMM. FORM 1324

12011032 B

Low pass Filter

REVISIONS

EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	PER ARTWORK CHANGE	8-19-71	
	D4	B	ADD INDUCTOR, CAPACITOR CHART	6-24-72	
		C	P.C. BOARD CHANGE	11-3-72	
		–	C1, C2, C4, C5, C7 & C8 (8.5 MHz) WERE 1500 PF HB	3-29-73	
		–	L1, L3, L5 (WAS) 1 μH, L2, L4 L6 (WAS) 12 μH ADDED MIN NULL (db) FOR R & 4 MHz OPR. HB	4-27-73	
		–	ADDED COMPONENTS FOR 4.8, 5.9, 6.5, 9.5 & 10.6 MHz FILTERS. ADDED NOTE 5 TO C3, C6 & C9 HB	7-12-73	



FREQ (MHz)	4.8	5.9	6.5	6.8	7.5	8.5	9.5	10.5	12	14
C1, C4, C7 (PF)	3300	1500	1500	2200	3300	3300	1500	1000	1000	470
C2, C5, C8 (PF)	NONE	1500	1500	470	680	NONE	1500	1500	1500	1500
L1, L3, L5 (μH)	0.33	0.24	0.20	0.20	0.125	0.125	0.10	0.10	0.10	.065
L2, L4, L6 (μH)	47	33	27	27	22	18	15	12	10	10
C3, C6, C9 (PF)	7-40	7-40	7-40	7-40	7-40	7-40	7-40	7-40	6-22	6-22
MIN NULL (db)	24	24	25	24	24	24	25	25	28	28
P.C. ASSY	152-0086	152-0085	152-0084	152-0076	152-0039	152-0074	152-0098	152-0087	152-0088	152-0089

5 FOR VALUES SEE CHART
4. ALL INDUCTOR VALUES ARE IN MICROHENRIES
3. CAPACITOR VALUES ARE IN PICOFARADS ±10%
2. ALL RESISTORS ARE IN OHMS ±5% 1/4 W
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY
	TCM-6A	

REQD PER	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .08 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION COMIC CORPORATION
SAN DIEGO, CA.

SCHEMATIC
SUBCARRIER NOTCH FILTER

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011033	C

SCALE NONE
SHEET 1 OF 1

12011033 C

Subcarrier Notch Filter

DCN	DATE	CHANGE
0032	1-22-74	R13 WAS 100K

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	PER ARTWORK CHANGE	5-9-72	
		B	C23,24,25 ADDED, L4 WAS 2.8,22uH, CV	11-6-72	
		C	ARTWORK CHANGE. NO CHANGE IN COMP VALUES NB	1-5-73	
			C3 WAS 7-90pf. R2 WAS 27	1-24-73	
		D	SEE DCN 0009 NB	4-23-73	
		—	R23 (WAS) 1.2K, R36 (WAS) 1.3K NB	7-17-73	
		E	DCN 0032	1-22-74	

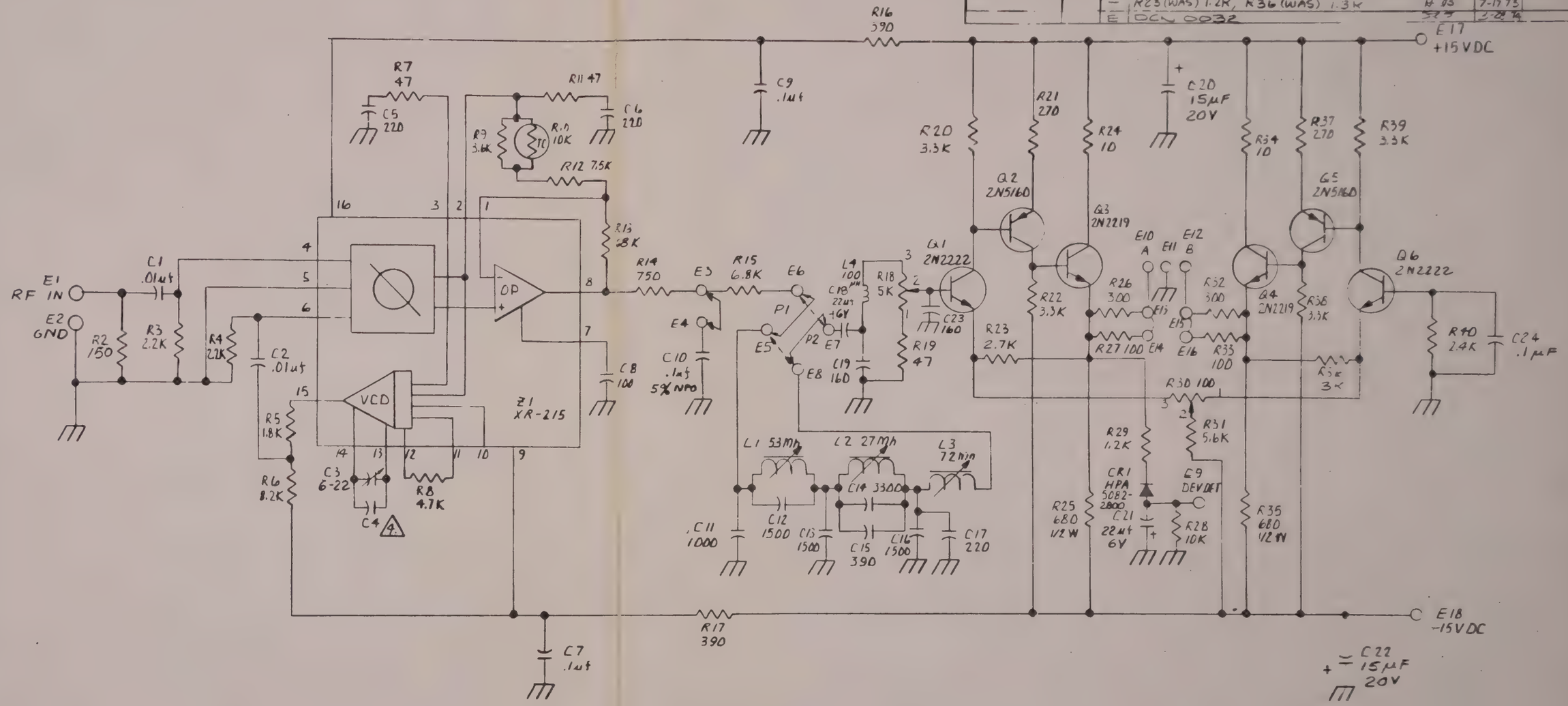


TABLE	
FREQ (MHz)	C4 (pf)
4.8	20
5.8 TO 8.5	10
9.0 TO 14.0	0

NARROW BAND
SUB CARRIER DE-MODULATOR

④ TO BE SELECTED SEE TABLE.
3. CAPACITORS ARE IN PF.
2. ALL RESISTORS ARE IN OHMS ± 5%, 1/4W
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY
	TCM-6	

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE

REQD PER ASSY

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE		
RELIABILITY		
ENGRG		
DESIGN	J Ross	8/9/72
CHECK		
DRAFT		8-9-72

DESIGN ACTIVITY APPROVAL

DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC NARROW BAND SUBCARRIER DEMODULATOR

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011057	E

SCALE NONE SHEET 1 OF 1

CONIC FORM 197A

12011057 E

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		B	REVISED FOR NEW ARTWORK HB	11-10-72	
		C	ARTWORK REVISED. R33 C27 ADDED	2-1-73	
		D	REVISED PER DCN 0010	4-20-73	J Ross

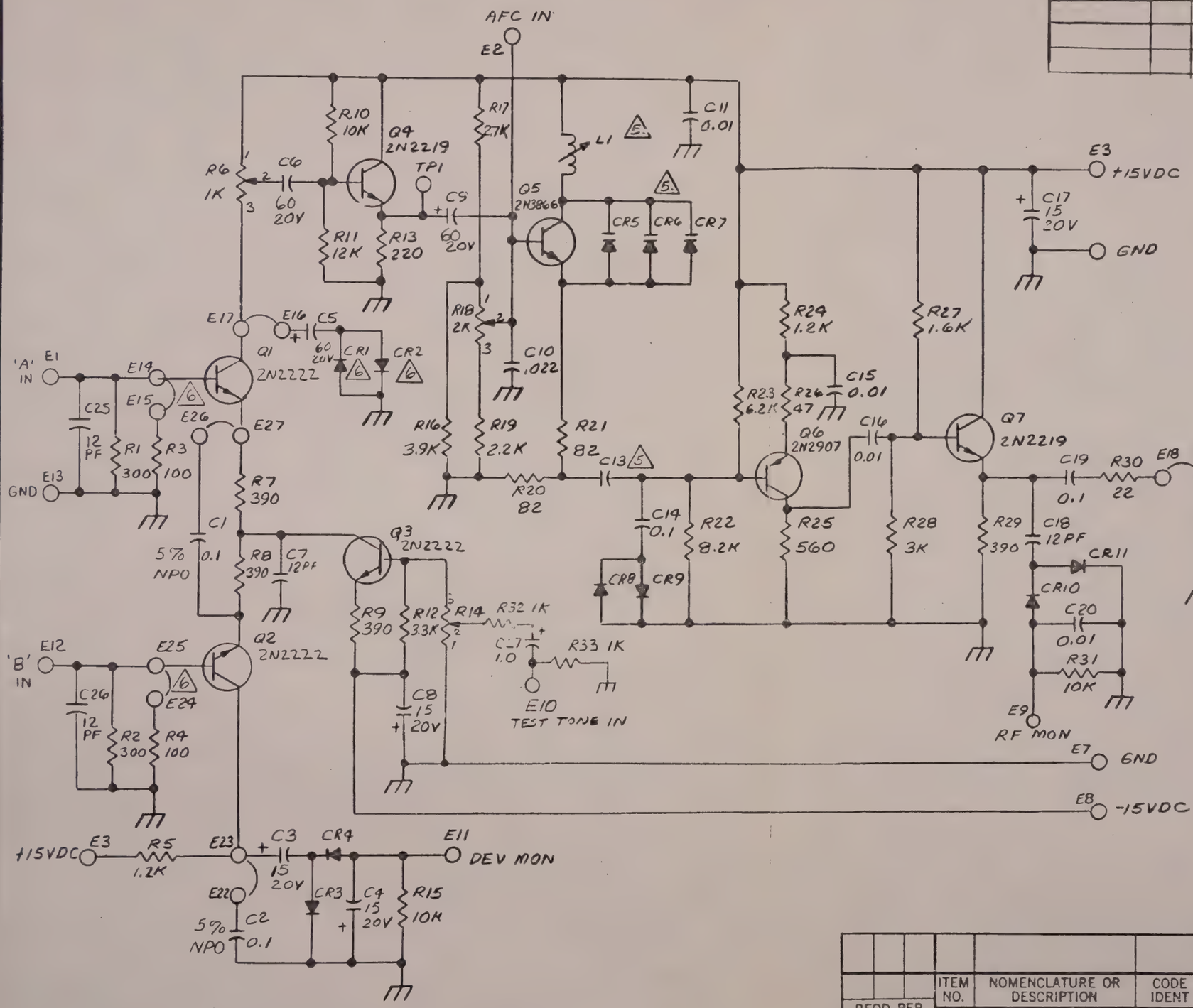


TABLE 2

Z IN (OHMS)	E14/15	E29/25	CR1/CR2
600 BAL	OPEN	OPEN	IN5179
150 BAL	SHORT	SHORT	IN4156
300 UNBAL	OPEN	OPEN	IN5179
75 UNBAL	SHORT	SHORT	IN4156

TABLE 1

FREQ	L1 μH	L2 μH	L4 μH	C13 pf	C22 PF	CR5	CR6	CR7
4.8 MHz	15	1.0	1.0	250	56	IN4800	IN4800	IN4800
5.8 MHz	10	0.68	0.68	200	39	IN4800	IN4800	IN4797
6.5 MHz	10	0.47	0.47	150	15	IN4800	IN4800	IN4796
6.8 MHz	10	0.47	0.47	120	15	IN4800	IN4800	IN4795
7.5 MHz	10	0.47	0.47	100	—	IN4800	IN4800	—
8.5 MHz	10	0.33	0.33	100	—	IN4800	IN4800	—
9.5 MHz	6.8	0.27	0.27	100	—	IN4800	IN4800	—
12 MHz	4.7	0.15	0.15	100	—	IN4800	IN4795	—
14 MHz	4.7	0.1	0.1	100	—	IN4800	—	—

NARROW BAND SUBCARRIER MODULATOR

△6 SEE TABLE 2
△5 SEE TABLE 1
4. DIODES ARE 5082-2800.
3. CAPACITORS ARE IN MICROFARADS
2 RESISTORS ARE IN OHM ±5%, 1/4 W.
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE
REQD PER ASSY	LIST OF MATERIAL					

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE		
RELIABILITY		
ENGRG		
DESIGN	J Ross	10/19/72
CHECK		
DRAFT	Ky Darby	11/10/72

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC NARROW BAND SUBCARRIER MODULATOR

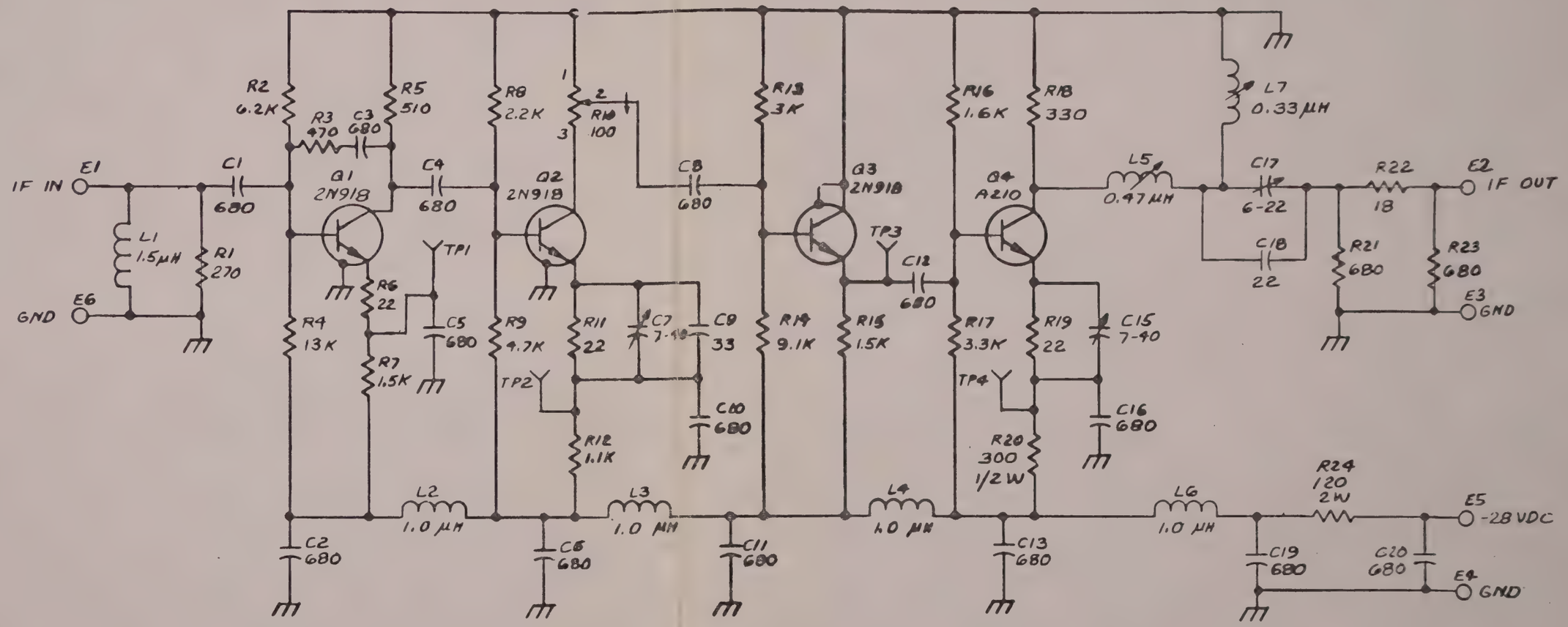
SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011058	D

SCALE NONE | SHEET 1 OF 1

12011058 D

CONIC FORM 197A

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	ARTWORK CHANGE. ADDED C20 PER DCN 0003 HB	5-1-73	



70 MHz AMP

4. C14 NOT USED
3. CAPACITOR VALUES ARE IN PICOFARADS.
2. ALL RESISTORS ARE IN OHMS ± 5% 1/4 WATT.
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY
	TCM-6A	

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE

REQD PER ASSY

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03, .XXX ± .010, HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE		
RELIABILITY		
ENGRG		
DESIGN		
CHECK		
DRAFT	H. Barker 9-4-72	

DESIGN ACTIVITY APPROVAL

DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CA

SCHEMATIC
70MHz AMPLIFIER

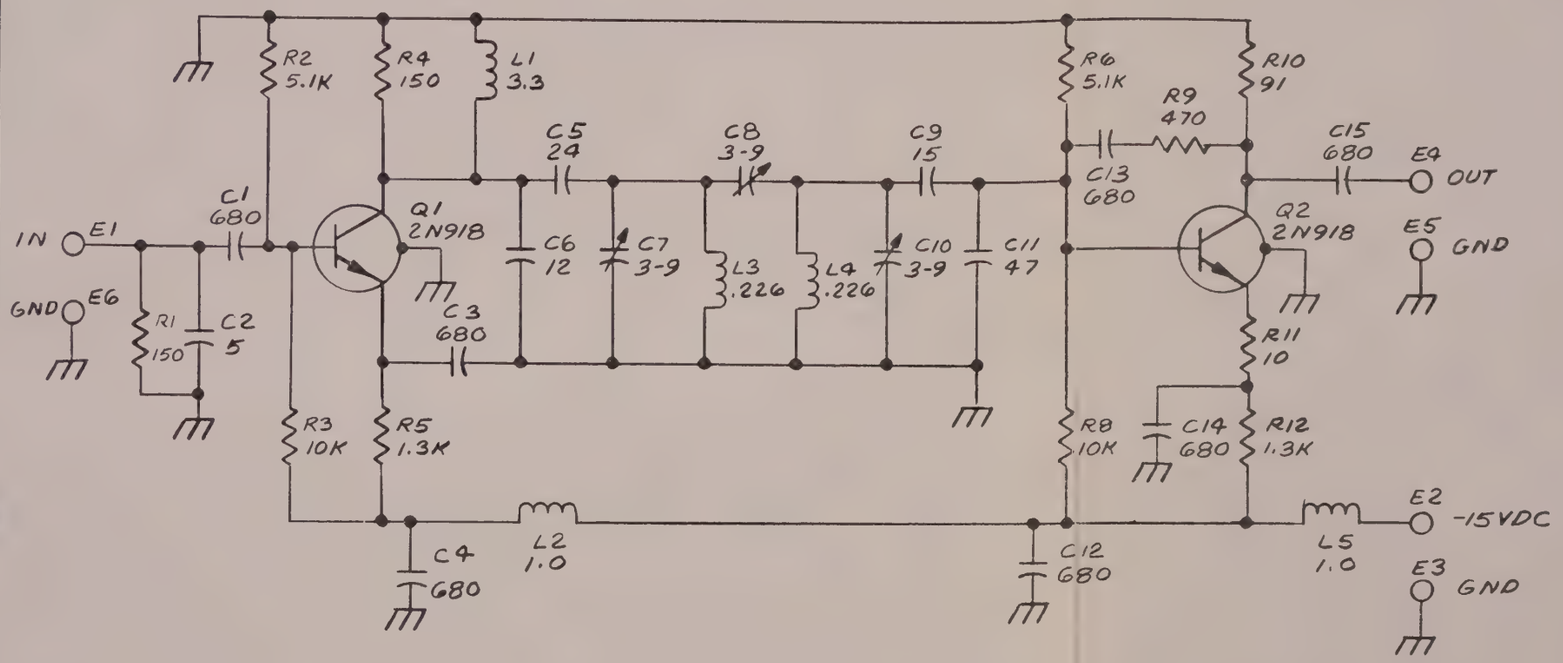
SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011519	A

SCALE NONE | SHEET 1 OF 1

CONIC FORM 189A

12011519 A

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED



70 MHZ FILTER AMP

4. INDUCTORS ARE IN MICROHENRIES.
3. CAPACITOR VALUES ARE IN PICOFARADS.
2. ALL RESISTORS ARE IN OHMS ±5%, 1/4W
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE
REQD PER ASSY						

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED	CONTRACT NUMBER
DIMENSIONS ARE IN INCHES	
TOLERANCES	
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387	ANGULAR ± 0° 30′
ALL MACHINED SURFACES √	
FINISH	

RELEASE		
RELIABILITY		
ENGRG		
DESIGN		
CHECK		
DRAFT	H Barker	1-8-73

DESIGN ACTIVITY APPROVAL

DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC
70MHz FILTER AMPLIFIER

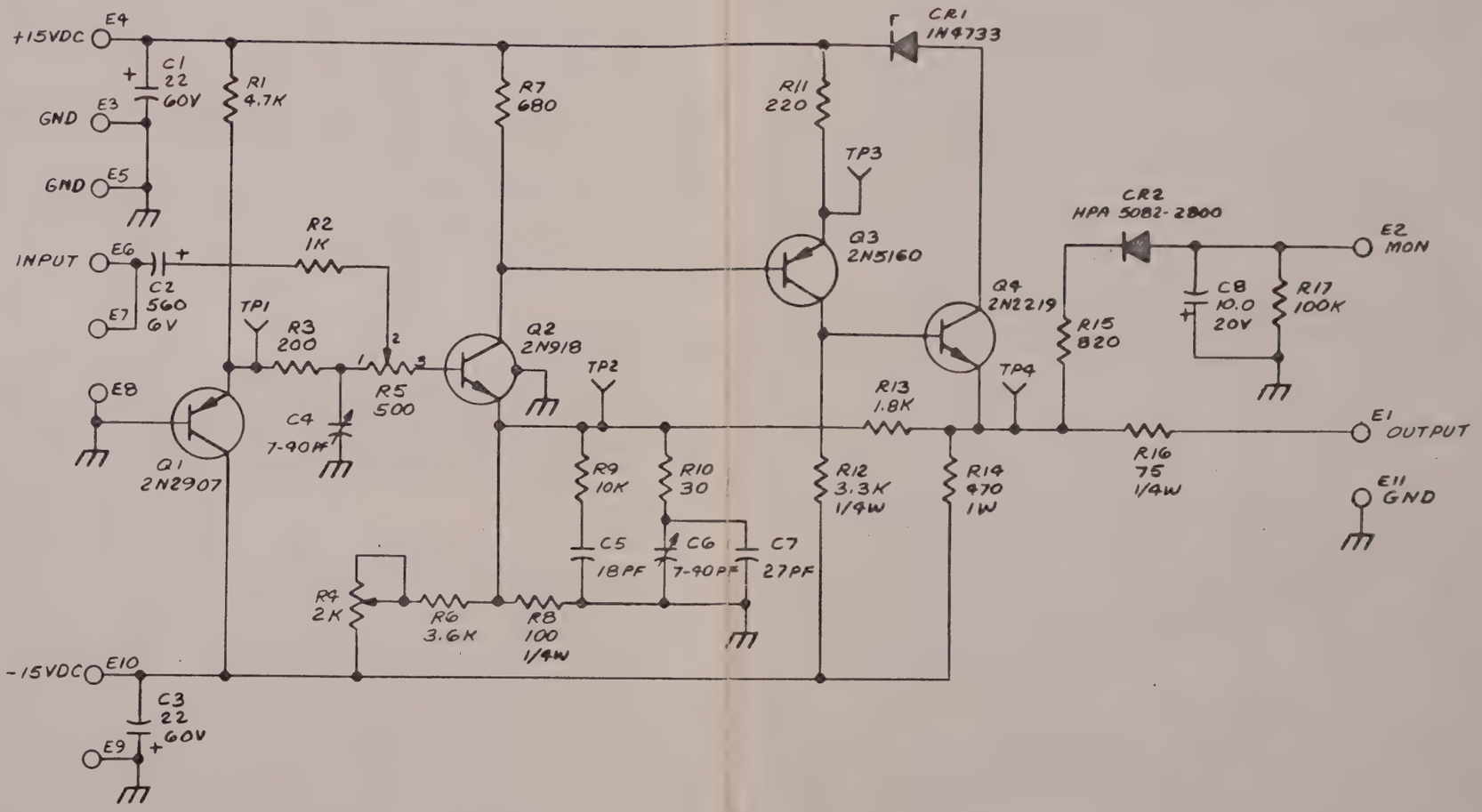
SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011533	

SCALE NONE | SHEET 1 OF 1

12011533

CONIC FORM 1974

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
			R4 (WAS) 2.5K, R13 (WAS) 2K, & C7 (WAS) 62PF H B	3-13-73	



12011536

BRIDGEING BASE-BAND AMP

3. CAPACITOR VALUES ARE IN MICROFARADS.
2. RESISTORS ARE IN OHMS ±5%, 1/8W.
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER
RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

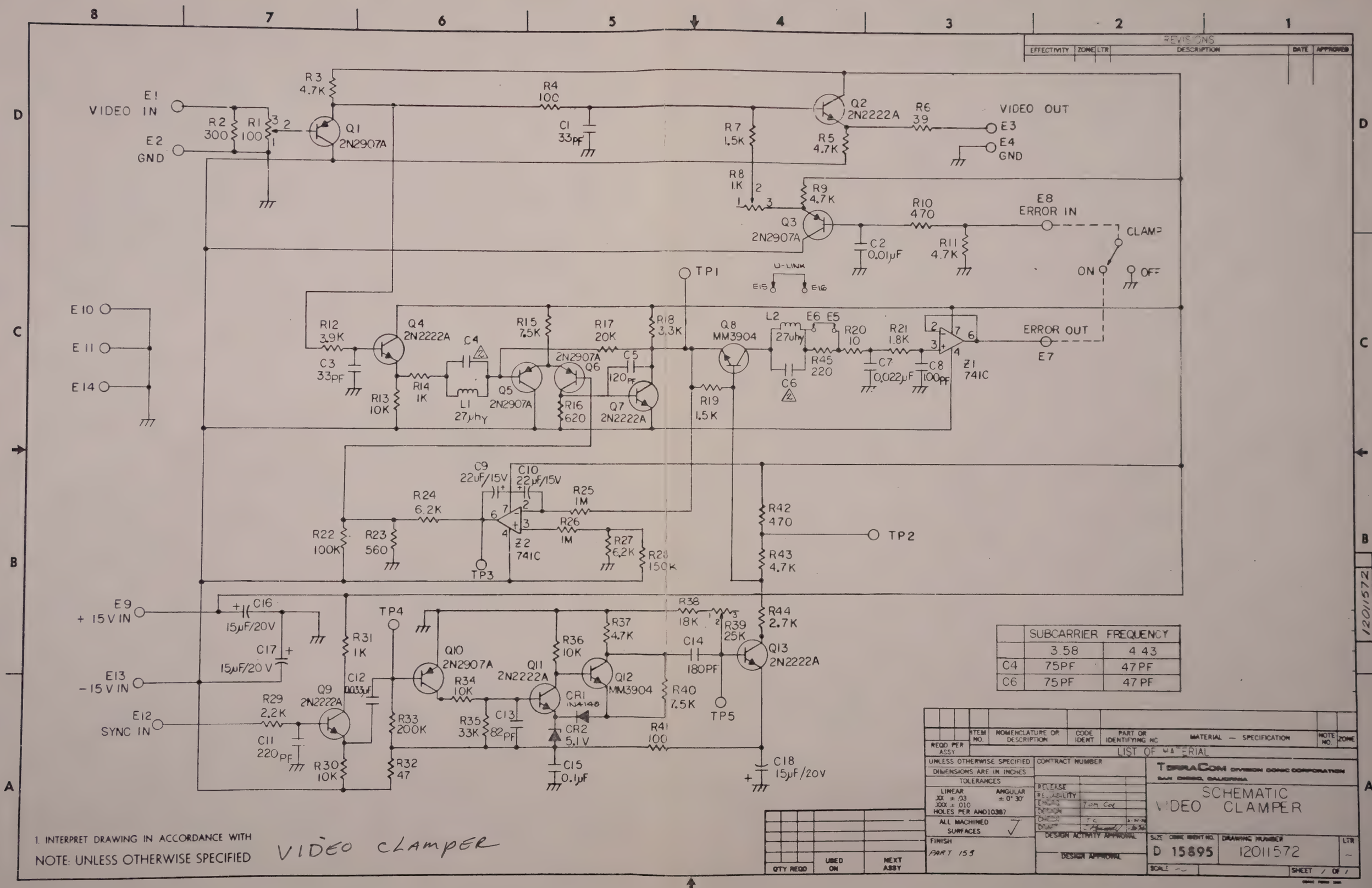
TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC
BRIDGEING BASE BAND AMPL

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011536	

SCALE NONE
SHEET 1 OF 1

CONIC FORM 197A



	SUBCARRIER FREQUENCY	
	3.58	4.43
C4	75PF	47PF
C6	75PF	47PF

1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

VIDEO CLAMPER

REVISIONS

EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO	MATERIAL — SPECIFICATION	NOTE NO.	ZONE

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES

LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387

ANGULAR ± 0° 30'

ALL MACHINED SURFACES

FINISH PART 153

CONTRACT NUMBER

RELEASE

RELIABILITY

ENGRG Tom Coe

DESIGN

CHECK TC

DRAFT

DESIGN ACTIVITY APPROVAL

DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION SAN DIEGO, CALIFORNIA

SCHEMATIC VIDEO CLAMPER

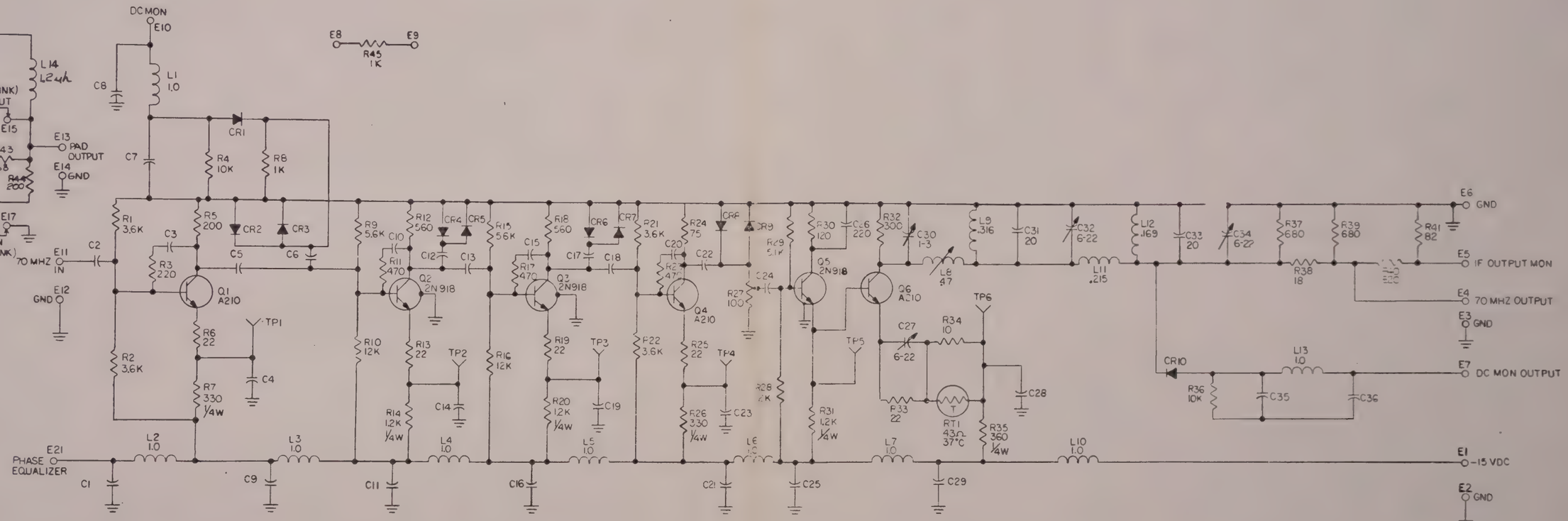
SIZE D CODE IDENT NO. 15895 DRAWING NUMBER 12011572 LTR ~

SCALE ~ SHEET 1 OF 1

QTY REQD | USED ON | NEXT ASSY

12011572

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED



5 DIODES ARE HPA-5082-2800
4 COILS ARE IN MICROHENRIES
3 CAPACITORS ARE 680 PICOFARADS
2 ALL RESISTORS ARE IN OHMS ± 5% 1/8 WATT.
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

70 MHZ LIMITER

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO	MATERIAL — SPECIFICATION	NOTE NO.	ZONE
REQD PER ASSY				LIST OF MATERIAL		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE		2-10-72
RELIABILITY		
ENGRG		
DESIGN		
CHECK		

DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

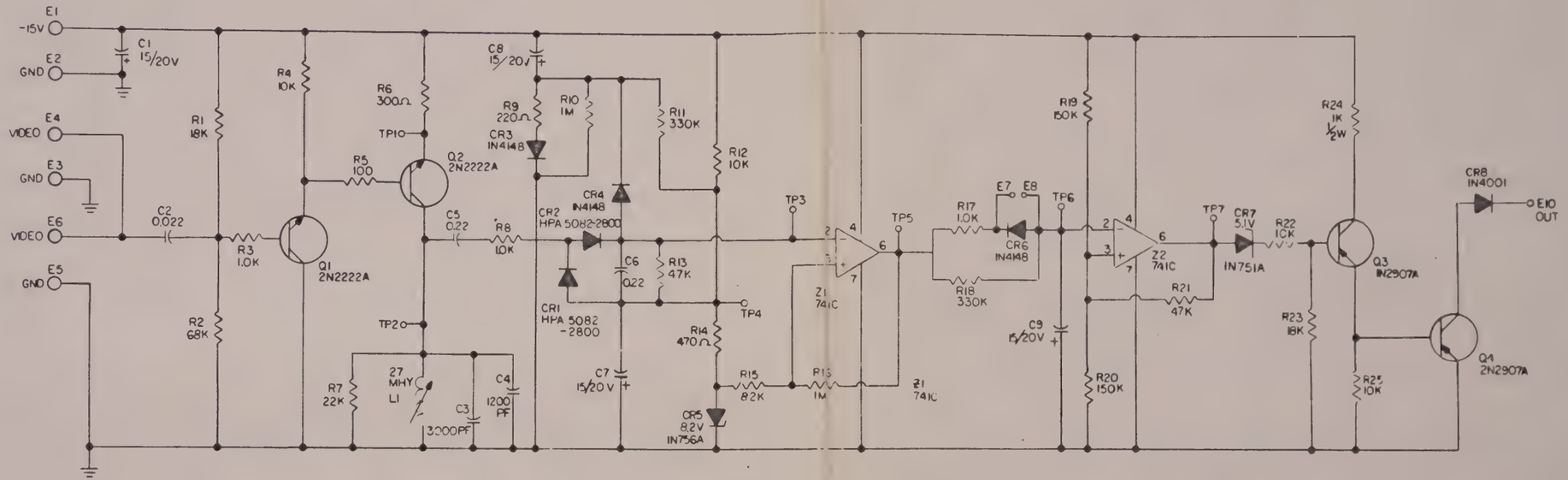
SCHEMATIC-
70 MHZ LIMITER

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
D	15895	12011598	—

SCALE —— SHEET OF

12011598 -1

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED



ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO	MATERIAL — SPECIFICATION	NOTE NO.	ZONE
REQD PER ASSY			LIST OF MATERIAL			

QTY REQD	USED ON	NEXT ASSY

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAF
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION DONIC CORPORATION
SAN DIEGO, CALIFORNIA

VIDEO SYNC DETECTOR

SIZE	CODE IDENT NO	DRAWING NUMBER	LTR
D	15895	12011630	

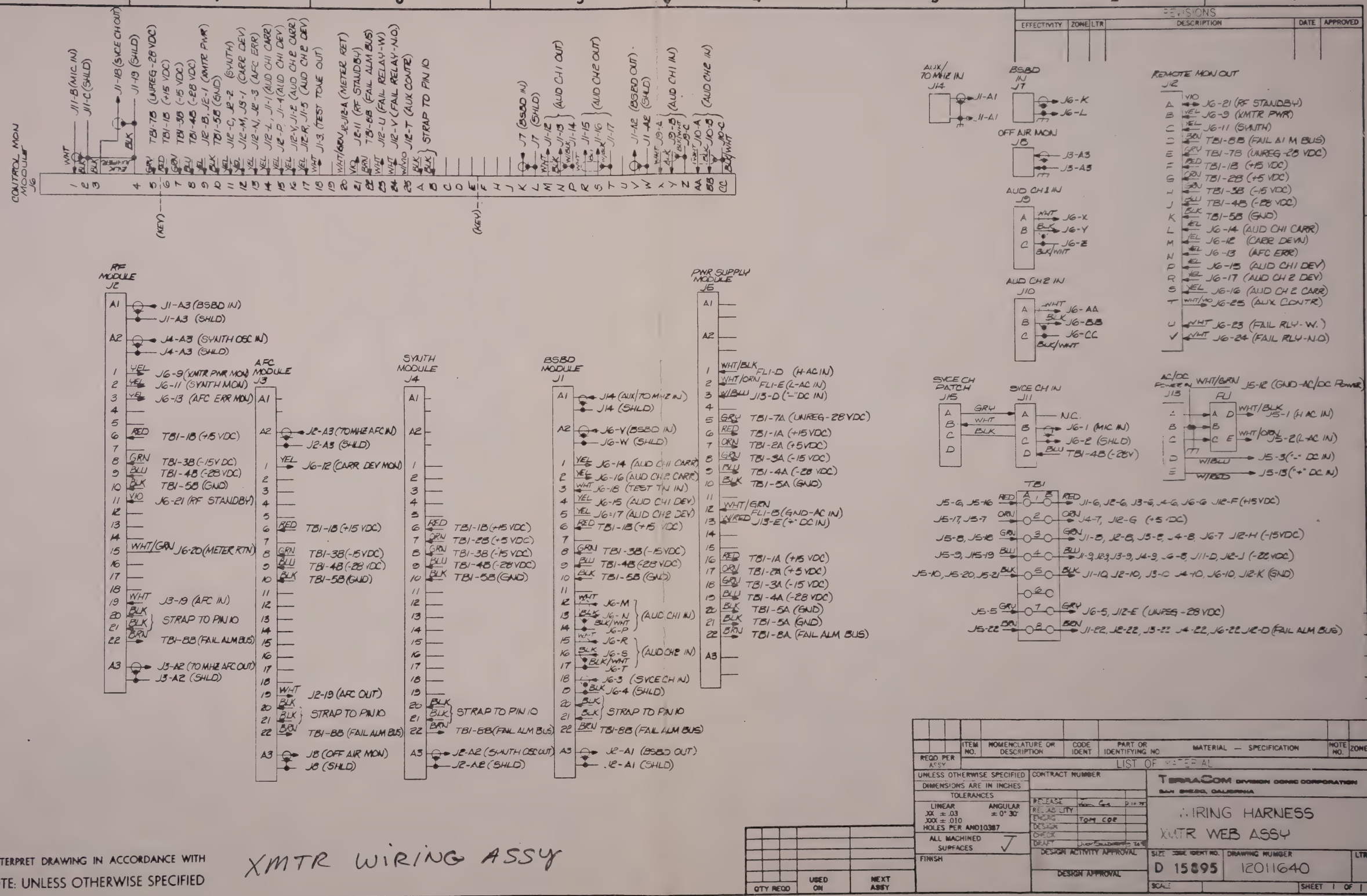
SCALE | SHEET OF

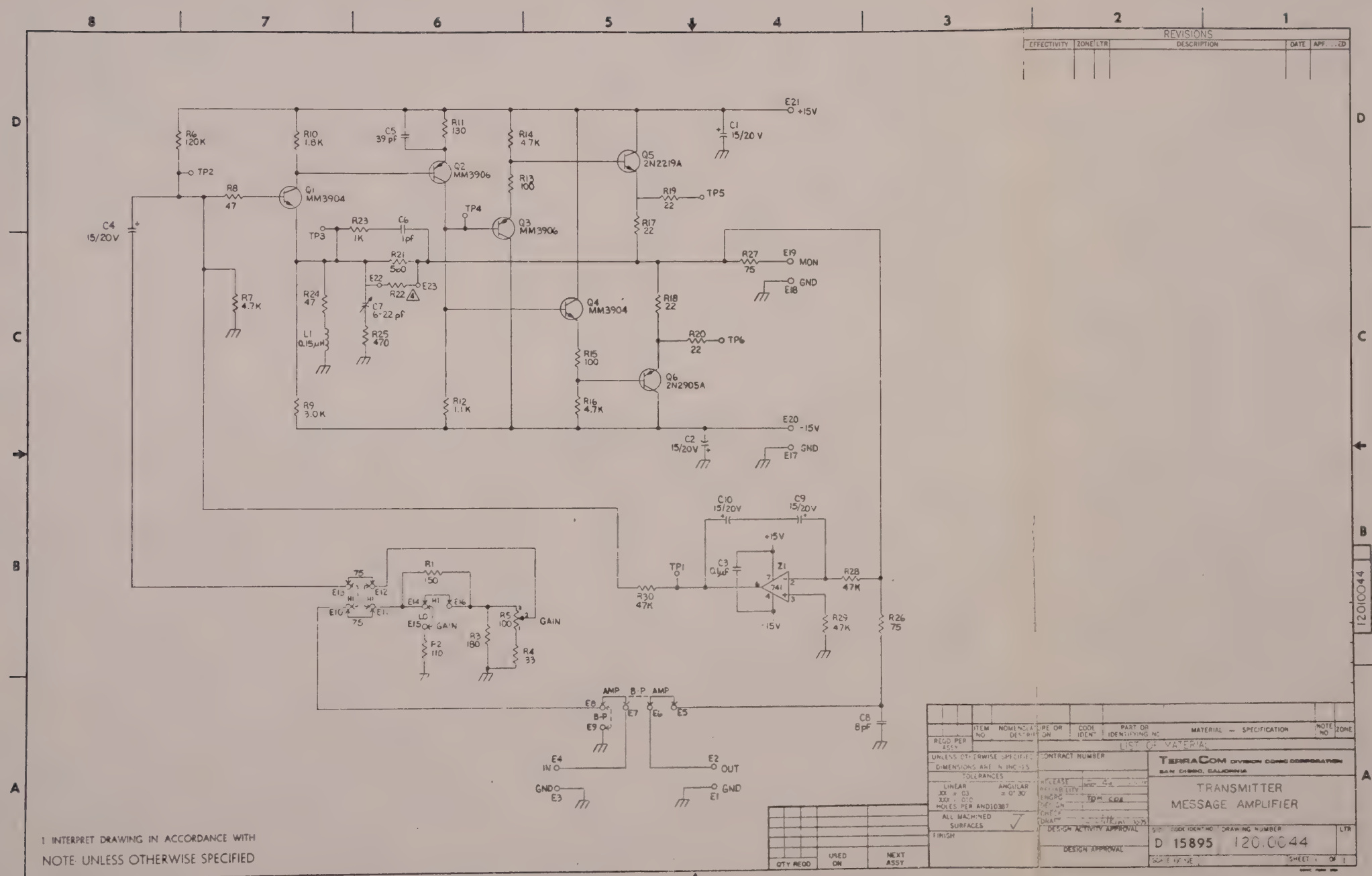
12011630

2. ALL RESISTORS ARE IN OHMS ± 5% ¼ WATT
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

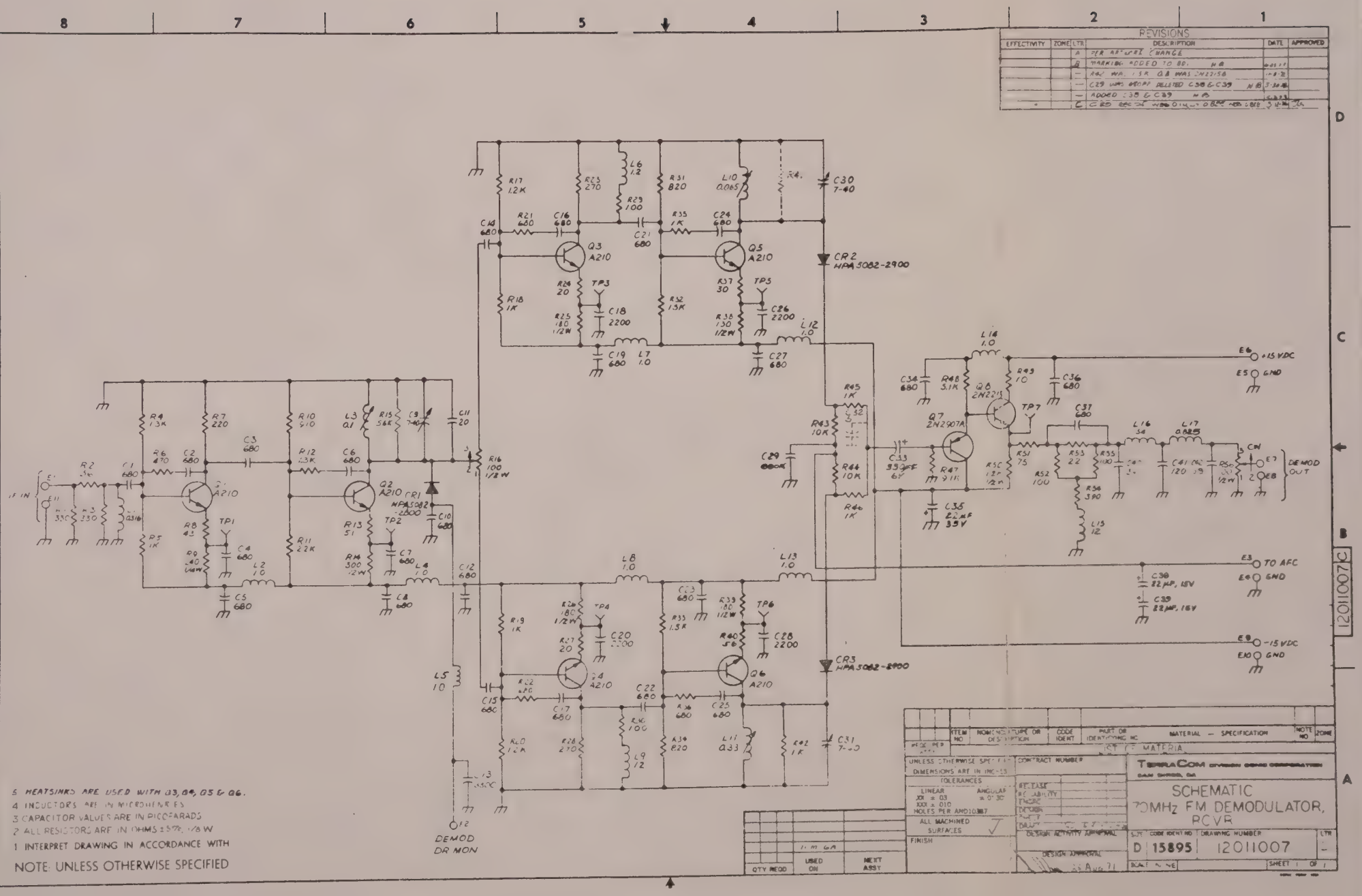
VIDEO SYNC DETECTOR


CONTROL MON MODULE J6
J11-B (MIC IN)
J11-C (SHLD)
J11-18 (SYCE CH OUT)
J11-19 (SHLD)
TB1-7B (UNREG-28 VDC)
TB1-1B (+15 VDC)
TB1-3B (-15 VDC)
TB1-4B (-28 VDC)
J12-B, J2-1 (XMTR PWR)
TB1-5B (GND)
J12-C, J2-2 (SYNTH)
J12-M, J3-1 (CARR DEV)
J12-N, J2-3 (AFC ERR)
J12-L, J1-1 (AUD CH1 CARR)
J12-P, J1-4 (AUD CH1 DEV)
J12-V, J1-2 (AUD CH2 CARR)
J12-R, J1-5 (AUD CH2 DEV)
J1-3 (TEST TONE OUT)
J7 (BSBD IN)
J7 (SHLD)
J1-12
J1-13
(AUD CH1 OUT)
J1-15
J1-16
(AUD CH2 OUT)
J1-17
J1-A2 (BSBD OUT)
J1-A2 (SHLD)
J9-A
J9-B
J9-C
(AUD CH1 IN)
J10-A
J10-B
J10-C
(AUD CH2 IN)
J12-A (METER RET)
J2-11 (RF STANDBY)
TB1-6B (FAIL ALM BUS)
J12-U (FAIL RELAY-W)
J12-V (FAIL RELAY-N.O.)
J12-T (AUX CONTR)
STRAP TO PIN 10
(KEY)
(KEY)
RF MODULE J2
J1-A3 (BSBD IN)
J1-A3 (SHLD)
J4-A3 (SYNTH OSC IN)
J4-A3 (SHLD)
J6-9 (XMTR PWR MON)
J6-11 (SYNTH MON)
J6-13 (AFC ERR MON)
TB1-1B (+15 VDC)
TB1-3B (-15 VDC)
TB1-4B (-28 VDC)
TB1-5B (GND)
J6-21 (RF STANDBY)
J6-20 (METER RTN)
J3-19 (AFC IN)
STRAP TO PIN 10
TB1-8B (FAIL ALM BUS)
J3-A2 (TO MHZ AFC OUT)
J3-A2 (SHLD)
AFC MODULE J3
J2-A3 (TO MHZ AFC IN)
J2-A3 (SHLD)
J6-12 (CARR DEV MON)
TB1-1B (+15 VDC)
TB1-3B (-15 VDC)
TB1-4B (-28 VDC)
TB1-5B (GND)
J2-19 (AFC OUT)
STRAP TO PIN 10
TB1-8B (FAIL ALM BUS)
J8 (OFF AIR MON)
J8 (SHLD)
SYNTH MODULE J4
TB1-1B (+15 VDC)
TB1-2B (+5 VDC)
TB1-3B (-15 VDC)
TB1-4B (-28 VDC)
TB1-5B (GND)
STRAP TO PIN 10
TB1-8B (FAIL ALM BUS)
J2-A2 (SYNTH OSC OUT)
J2-A2 (SHLD)
BSBD MODULE J1
J14 (AUX/TO MHZ IN)
J14 (SHLD)
J6-V (BSBD IN)
J6-W (SHLD)
J6-14 (AUD CH1 CARR)
J6-16 (AUD CH2 CARR)
J6-18 (TEST TN IN)
J6-15 (AUD CH1 DEV)
J6-17 (AUD CH2 DEV)
TB1-1B (+15 VDC)
TB1-3B (-15 VDC)
TB1-4B (-28 VDC)
TB1-5B (GND)
J6-M
J6-N
J6-P
(AUD CH1 IN)
J6-R
J6-S
J6-T
(AUD CH2 IN)
J6-3 (SYCE CH IN)
J6-4 (SHLD)
STRAP TO PIN 10
TB1-8B (FAIL ALM BUS)
J2-A1 (BSBD OUT)
J2-A1 (SHLD)
PWR SUPPLY MODULE J6
FL1-D (H-AC IN)
FL1-E (L-AC IN)
J13-D ("-" DC IN)
TB1-7A (UNREG-28 VDC)
TB1-1A (+15 VDC)
TB1-2A (+5 VDC)
TB1-3A (-15 VDC)
TB1-4A (-28 VDC)
TB1-5A (GND)
FL1-B (GND-AC IN)
J13-E ("+" DC IN)
TB1-1A (+15 VDC)
TB1-2A (+5 VDC)
TB1-3A (-15 VDC)
TB1-4A (-28 VDC)
TB1-5A (GND)
TB1-5A (GND)
TB1-8A (FAIL ALM BUS)
AUX/TO MHZ IN J14
J1-A1
J1-A1
BSBD IN J7
J6-K
J6-L
OFF AIR MON J8
J3-A3
J3-A5
AUD CH1 IN J9
J6-X
J6-Y
J6-Z
BLK/WHT
AUD CH2 IN J10
J6-AA
J6-BB
J6-CC
BLK/WHT
SYCE CH PATCH J15
SYCE CH IN J11
N.C.
J6-1 (MIC IN)
J6-2 (SHLD)
TB1-4B (-28V)
REMOTE MON OUT J2
J6-21 (RF STANDBY)
J6-9 (XMTR PWR)
J6-11 (SYNTH)
TB1-8B (FAIL A1 M BUS)
TB1-7B (UNREG-28 VDC)
TB1-1B (+15 VDC)
TB1-2B (+5 VDC)
TB1-3B (-15 VDC)
TB1-4B (-28 VDC)
TB1-5B (GND)
J6-14 (AUD CH1 CARR)
J6-12 (CARR DEVN)
J6-13 (AFC ERR)
J6-15 (AUD CH1 DEV)
J6-17 (AUD CH 2 DEV)
J6-16 (AUD CH 2 CARR)
J6-25 (AUX CONTR)
J6-23 (FAIL RLY-W.)
J6-24 (FAIL RLY-N.O)
AC/DC POWER IN J13
WHT/BRN
J5-12 (GND-AC/DC POWER)
FL1
WHT/BLK J5-1 (H AC IN)
WHT/ORN J5-2 (L-AC IN)
J5-3 ("-" DC IN)
J5-13 ("+" DC IN)
W/BLU
W/RED
TB1
J5-6, J5-16
J1-6, J2-6, J3-6, J4-6, J6-6 J12-F (+15 VDC)
J5-17, J5-7
J4-7, J12-G (+5 VDC)
J5-8, J5-18
J1-8, J2-8, J3-8, J4-8 J6-7 J12-H (-15 VDC)
J5-9, J15-19
J1-9, J2-9, J3-9, J4-9, J6-8, J11-D, J12-J (-28 VDC)
J5-10, J5-20, J5-21
J1-10, J2-10, J3-10 J4-10, J6-10, J12-K (GND)
J5-5
J6-5, J12-E (UNREG -28 VDC)
J5-22
J1-22, J2-22, J3-22 J4-22, J6-22 J12-D (FAIL ALM BUS)
REVISIONS
EFFECTIVITY
ZONE
LTR
DESCRIPTION
DATE
APPROVED
ITEM NO.
NOMENCLATURE OR DESCRIPTION
CODE IDENT
PART OR IDENTIFYING NO
MATERIAL — SPECIFICATION
NOTE NO.
ZONE
REQD PER ASSY
LIST OF MATERIAL
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010
ANGULAR ± 0° 30'
HOLES PER AMD10387
ALL MACHINED SURFACES
FINISH
CONTRACT NUMBER
RELEASE
RELIABILITY
ENGINEER TOM COE
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL
TERRACOM DIVISION OMNI CORPORATION
SAN DIEGO, CALIFORNIA
WIRING HARNESS
XMTR WEB ASSY
SIZE
CODE IDENT NO.
D 15895
DRAWING NUMBER
12011640
LTR
SCALE
SHEET 1 OF 1
QTY REQD
USED ON
NEXT ASSY
1. INTERPRET DRAWING IN ACCORDANCE WITH
NOTE: UNLESS OTHERWISE SPECIFIED
XMTR WIRING ASSY
12011640

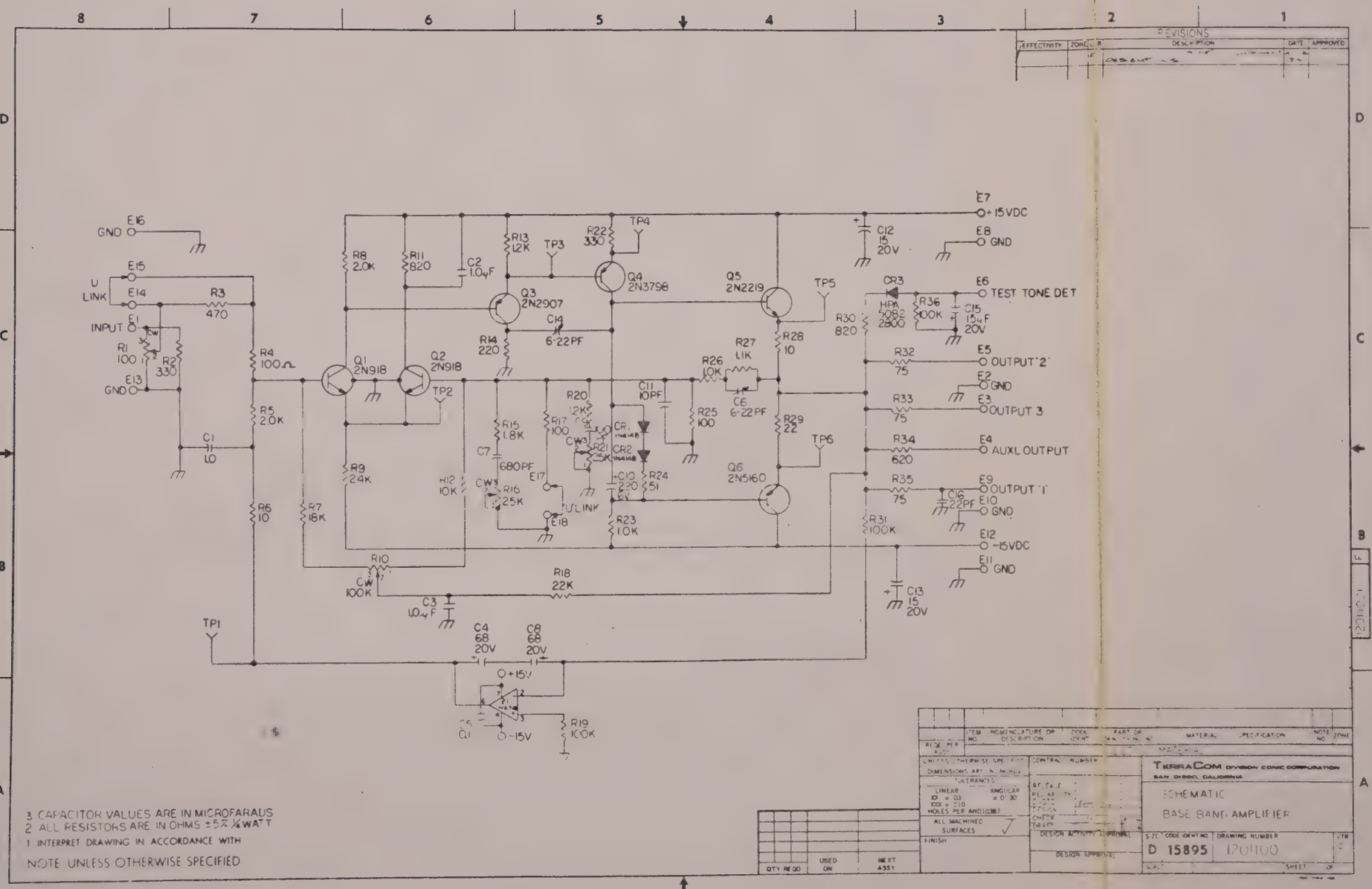


XMTR — MESSAGE AMPLIFIER

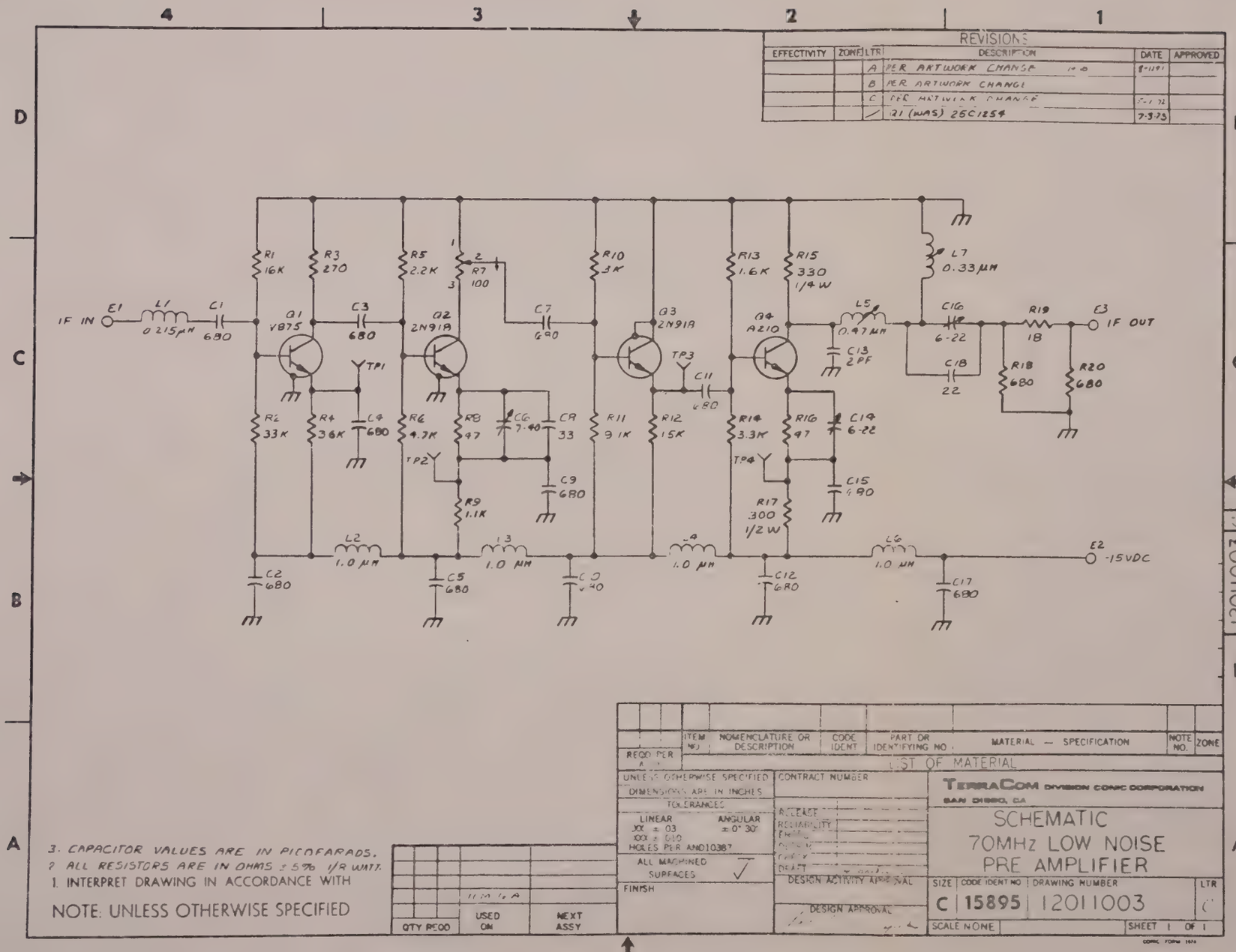
REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	PER ARTWORK CHANGE		
		B	MARKING ADDED TO BD. N.B.	6-15-71	
		—	R42 WAS 1.5K Q8 WAS 2N2215B	11-8-71	
		—	C29 WAS 680PF DELETED C38 & C39 N.B.	3-30-72	
		—	ADDED C38 & C39 N.B.	5-8-72	
		C	CR5 DELETED WAS 1N4148 DIODE PER ECO 1868	3-14-74	



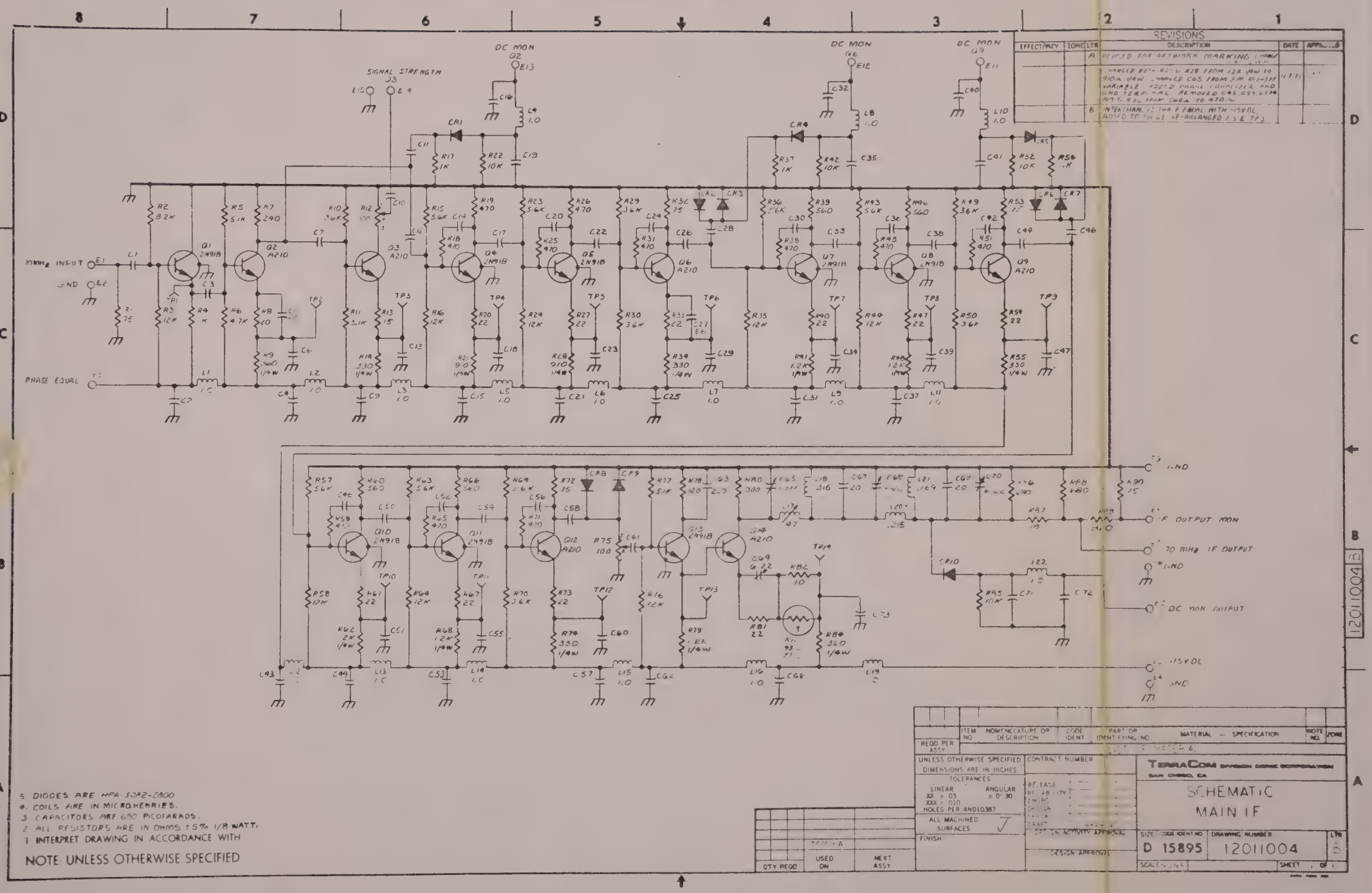
70 MHz FM DEMODULATOR RCVR



BASE BAND AMPLIFIER

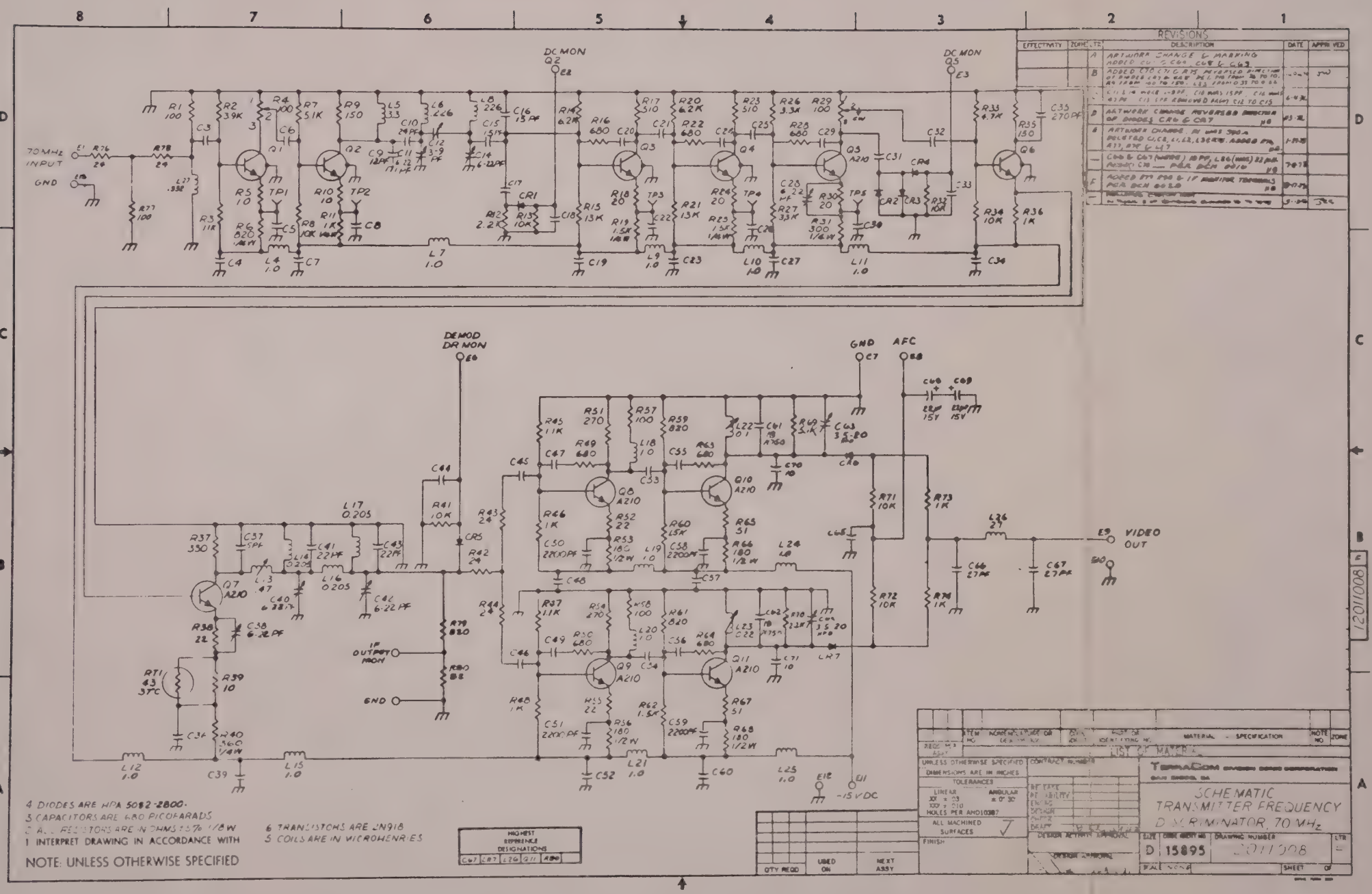


70 MHz Low Noise
Pre-Amplifier

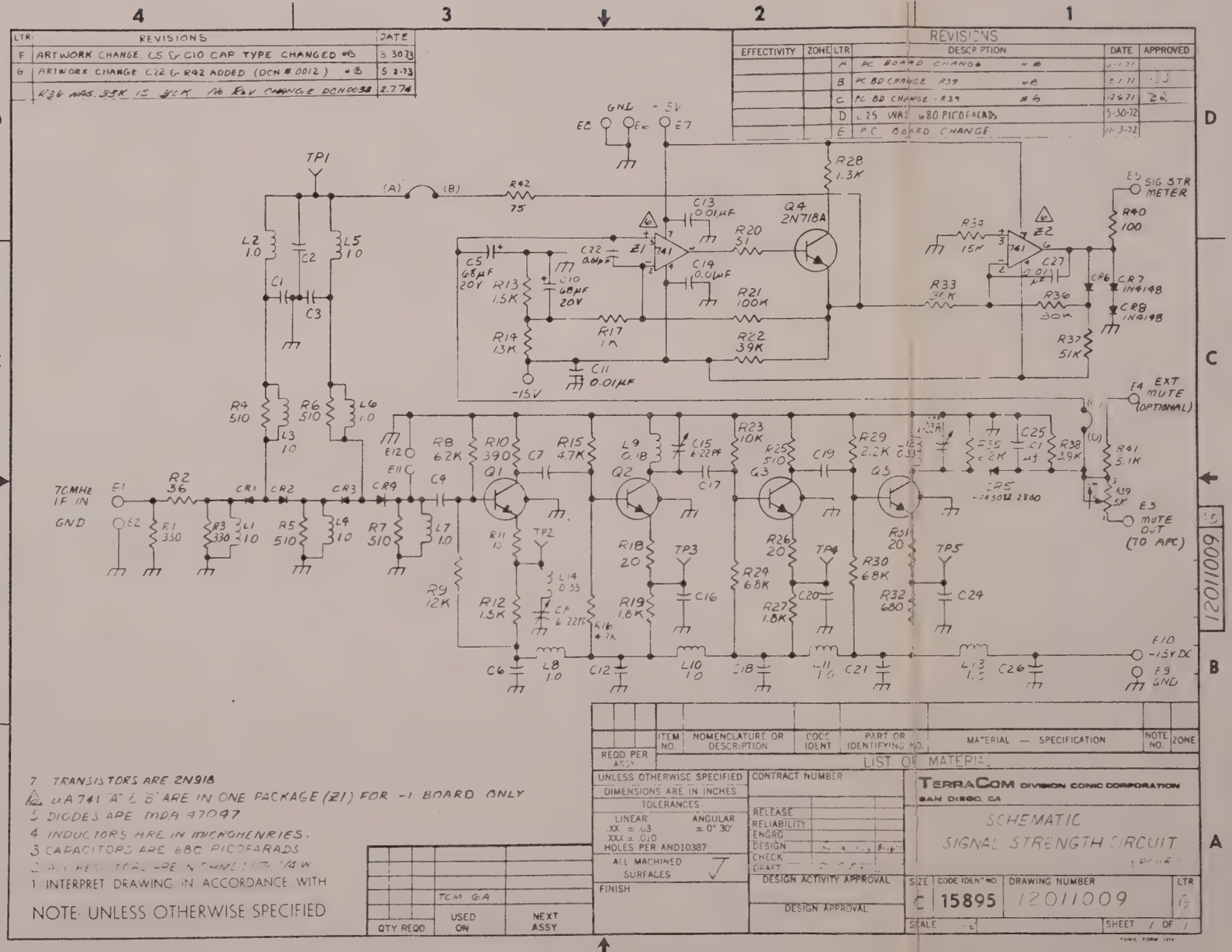


REVISIONS
EFFECTIVITY
ZONE
LTR
DESCRIPTION
DATE
APPROVED
A
REVISED FOR ARTWORK MARKING
B
INTERCHANGED PHASE EQUAL WITH -15VDC
DC MON
SIGNAL STRENGTH
MMHz INPUT
GND
PHASE EQUAL
IF OUTPUT MON
70 MHz IF OUTPUT
DC MON OUTPUT
-15VDC
5 DIODES ARE HPA-5082-2800
4. COILS ARE IN MICROHENRIES.
3 CAPACITORS ARE 680 PICOFARADS.
2 ALL RESISTORS ARE IN OHMS ±5% 1/8 WATT.
1 INTERPRET DRAWING IN ACCORDANCE WITH
NOTE: UNLESS OTHERWISE SPECIFIED
ITEM NO
NOMENCLATURE OR DESCRIPTION
CODE IDENT
PART OR IDENTIFYING NO
MATERIAL — SPECIFICATION
NOTE NO.
ZONE
REQD PER ASSY
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR
ANGULAR
HOLES PER AND10387
ALL MACHINED SURFACES
FINISH
CONTRACT NUMBER
RELEASE
DESIGN APPROVAL
TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CA
SCHEMATIC
MAIN IF
SIZE
CODE IDENT NO
DRAWING NUMBER
D 15895
12011004
LTR
B
SCALE
SHEET 1 OF 1
QTY REQD
USED ON
NEXT ASSY
12011004 B

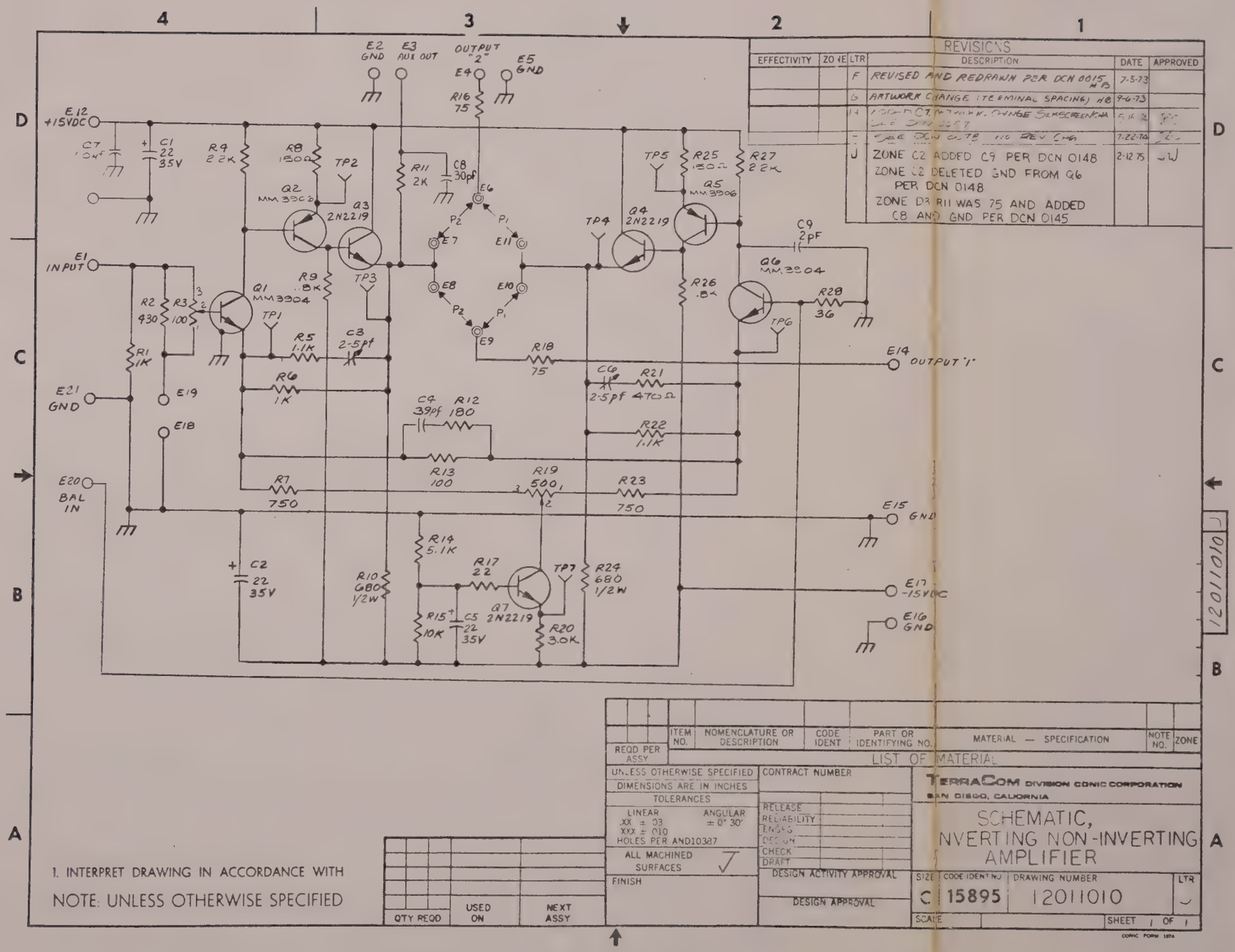
MAIN I.F.



XMTR - FREQ - DISCRIMINATOR



SIGNAL STRENGTH CIRCUIT



REVISIONS

EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		F	REVISED AND REDRAWN PER DCN 0015 HB	7-5-73	
		G	ARTWORK CHANGE (TERMINAL SPACING) HB	9-6-73	
		H	PER DCN 0287 CHANGE SILKSCREEN HA LLE DAN 0287	5-16-74	
		-	PER DCN 0478 NO REV CHG	7-22-74	
		J	ZONE C2 ADDED C9 PER DCN 0148 ZONE C2 DELETED GND FROM Q6 PER DCN 0148 ZONE D3 R11 WAS 75 AND ADDED C8 AND GND PER DCN 0145	2-12-75	

12011010 J

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE	REQD PER ASSY

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR XX ± .03 XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES
FINISH

CONTRACT NUMBER

RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC, INVERTING NON-INVERTING AMPLIFIER

SIZE	CODE IDENT NO	DRAWING NUMBER	LTR
C	15895	12011010	J

SCALE | SHEET 1 OF 1

QTY REQD	USED ON	NEXT ASSY

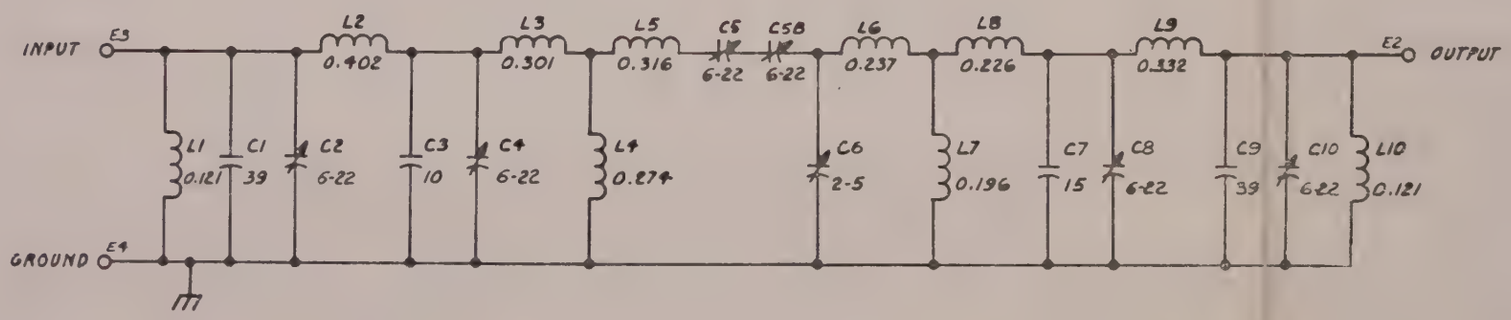
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

CONIC FORM 187A

INVERTING NON-INVERTING AMP

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	ARTWORK CHANGE TO ADD MARKING & CHANGE BOARD SIZE		
		B	ARTWORK CHANGE, ADDED TWO HOLES FOR ADJUSTMENT	6-4-72	
		C	E1 REMOVED, C9 RE-LOCATED	9-4-72	



TEST SPECIFICATIONS	
fc	70 MHz
BAND PASS	±10 MHz
LOSS	3 db

3. COILS ARE IN MICROHENRIES.
2. ALL CAPACITOR VALUES ARE IN PICOFARADS.
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY
	TCM-6A	

REQD PER	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AN010387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

DESIGN ACTIVITY APPROVAL

DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CA

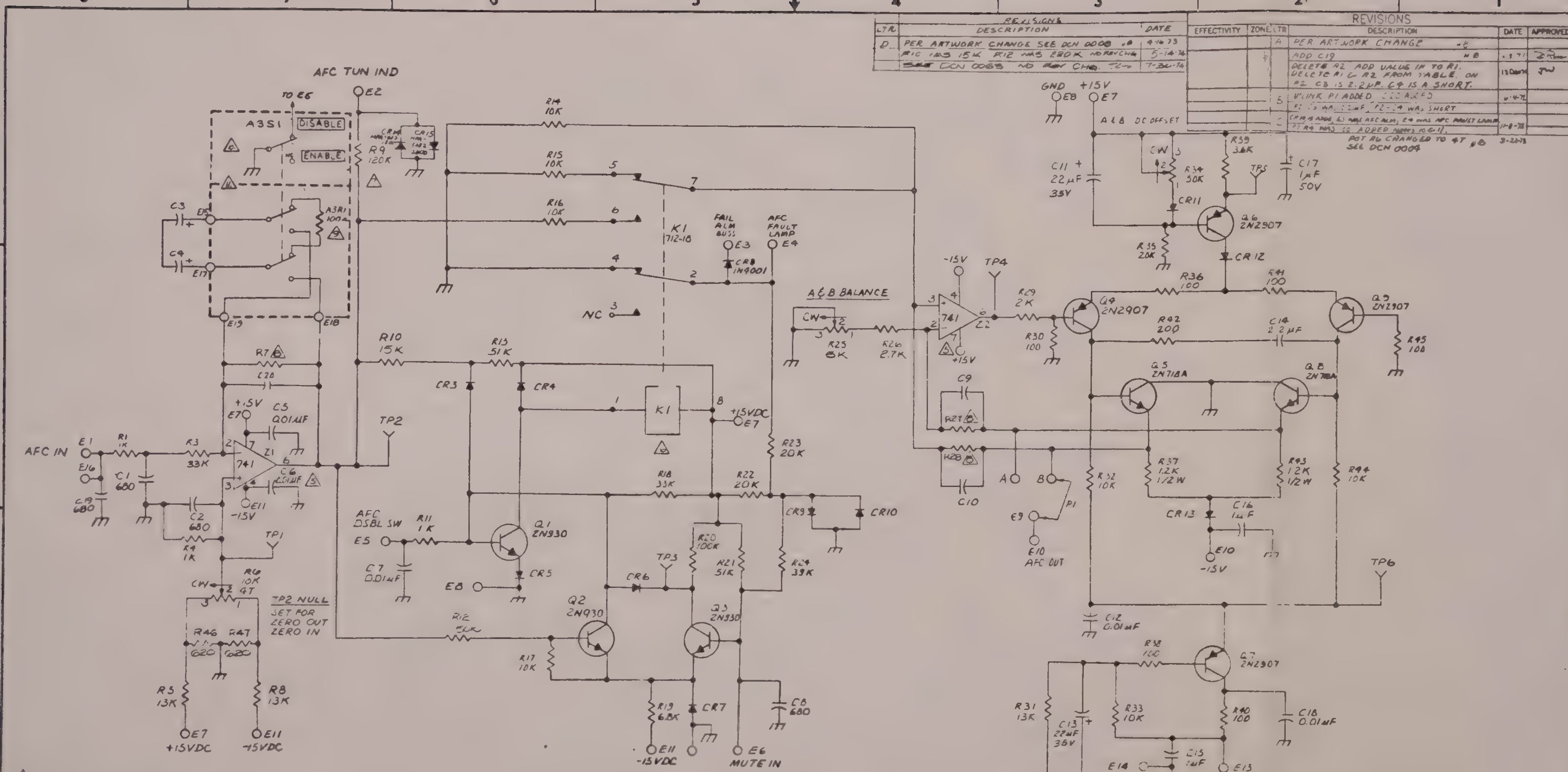
SCHEMATIC
70MHZ I.F. BAND-PASS FILTER

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011012	C

SCALE NONE SHEET 1 OF 1

12011012 C

70 MHZ I.F. BAND-PASS-FILTER



△ A3S1 IS 3PDT FOR XMTR

△ A3S1 IS SPDT FOR RCVR

△ 3PDT SWITCH MOUNTED ON FRONT OF MODULE, (100Ω RESISTOR MOUNTED ON SWITCH). THESE PARTS DO NOT COME WITH THIS ASSEMBLY. THEY ARE SHOWN FOR REFERENCE ONLY.

△ P1 IS USED ON TRANSMITTER. P2 IS USED ON RECEIVER

△ VALUE DETERMINED BY INDICATOR USED (2K MIN)

△ RELAY SHOWN DE-ENERGIZED

△ 8 PIN OPERATIONAL AMPLIFIER

4. ALL DIODES ARE IN914

3. ALL CAPACITORS ARE IN PICOFARADS ±20%, 50V

2. ALL RESISTORS ARE IN OHMS ±5%, 1/4W

1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

	P1 (XMTR)	P2 (RCVR)
C3	68µF 20V	OPEN
C4	68µF 20V	OPEN
C20	OPEN	0.082µF
C9	0.1µF	10µF 35V
C10	0.1µF	10µF 35V
[illegible]	MEG	280K
R2[illegible]	[illegible]K	330K
R26	[illegible]K	330K

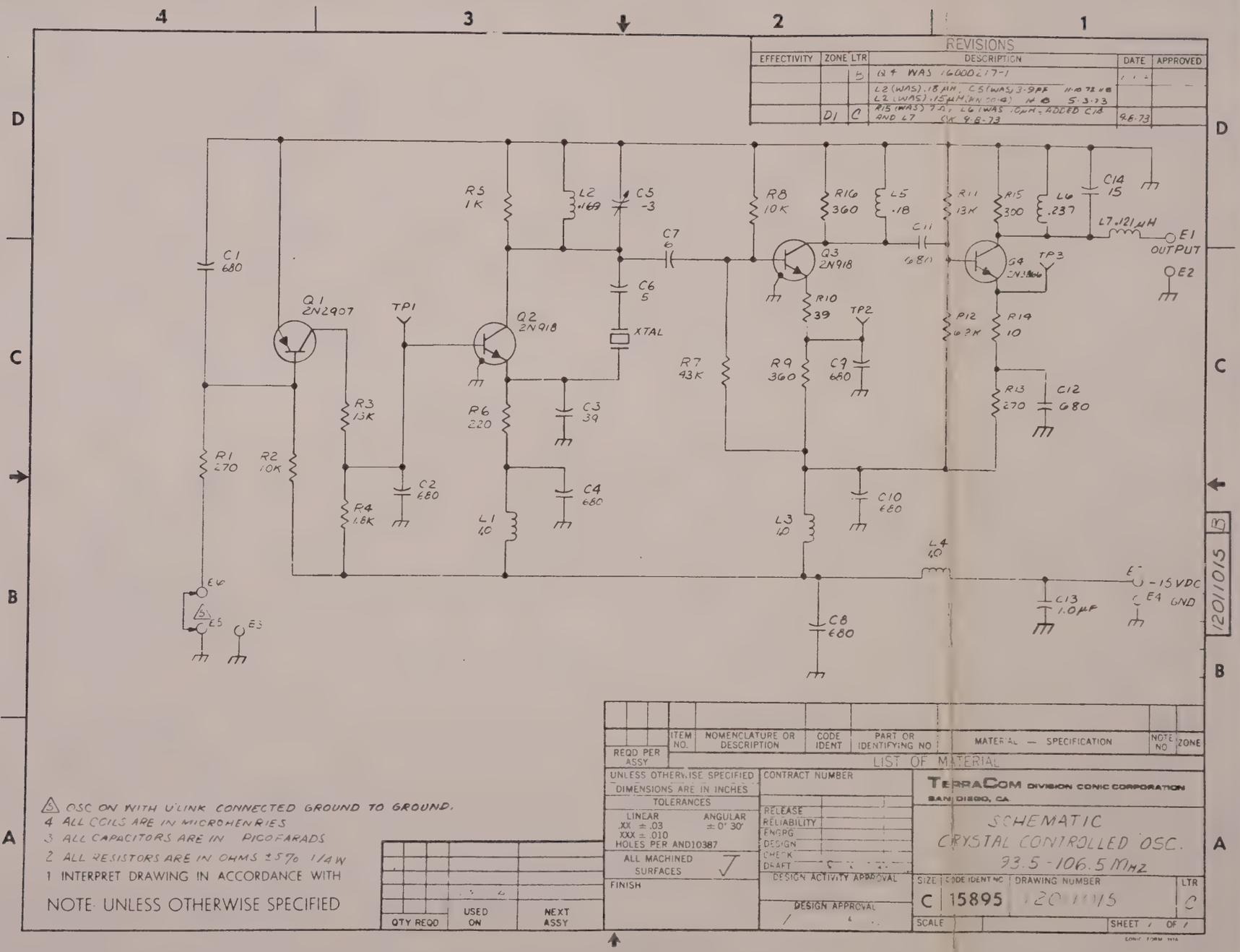
TEKRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CA

SCHEMATIC
AFC (P1, P2)

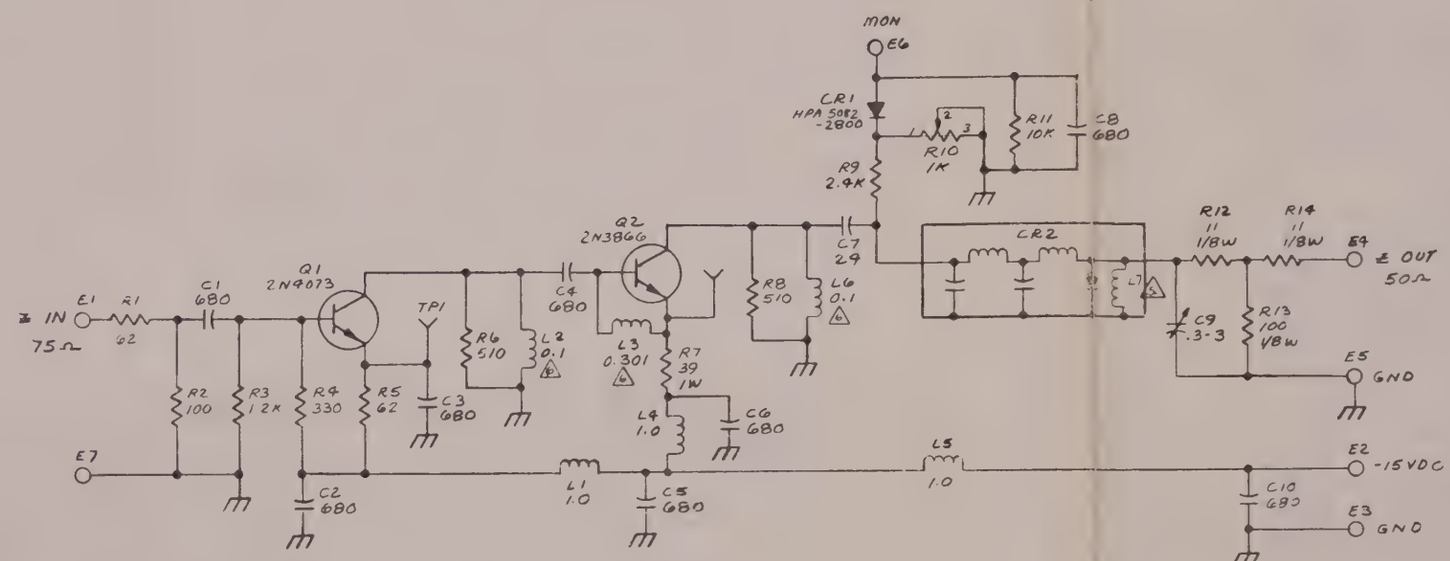
SIZE D | CODE IDENT NO. 15895 | DRAWING NUMBER 12011014 | LTR D

SCALE NONE | SHEET 1 OF 1

AFC



CRYSTAL CONTROLLED OSC



REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		D	REVISE & REDRAWN PER DCN 0027	9-13	
DCN 0034			K5 WAS: 60Ω ; CK	12274	

12011017 D

△6 PRECISION COILS (1%)

△5 COIL IS EXTERNAL WHEN HPA32002B IS USED, 1/2 DIA. #28, 4 TURNS

4. COILS ARE IN MICROHENRIES
3. CAPACITOR VALUES ARE IN PICOFARADS.
2. RESISTORS ARE IN OHMS ±5%, 1/4W
1 INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE
REQD PER ASSY						

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010
ANGULAR ± 0° 30
HOLES PER AND10387
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

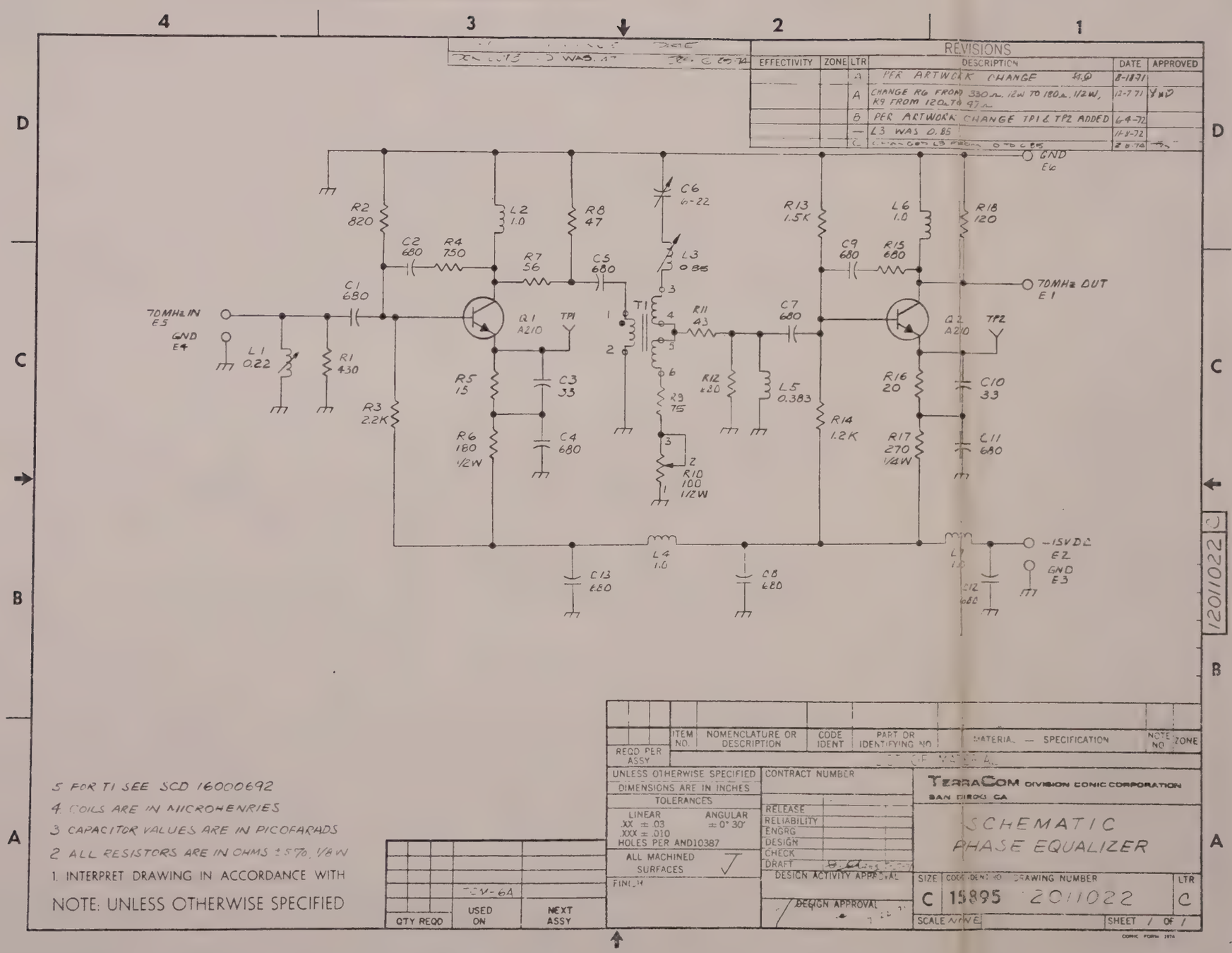
SCHEMATIC
LOCAL OSC., PWR AMPL
& MULTIPLIER

SIZE	CODE IDENT NO	DRAWING NUMBER	LTR
C	15895	12011017	D

SCALE | SHEET OF

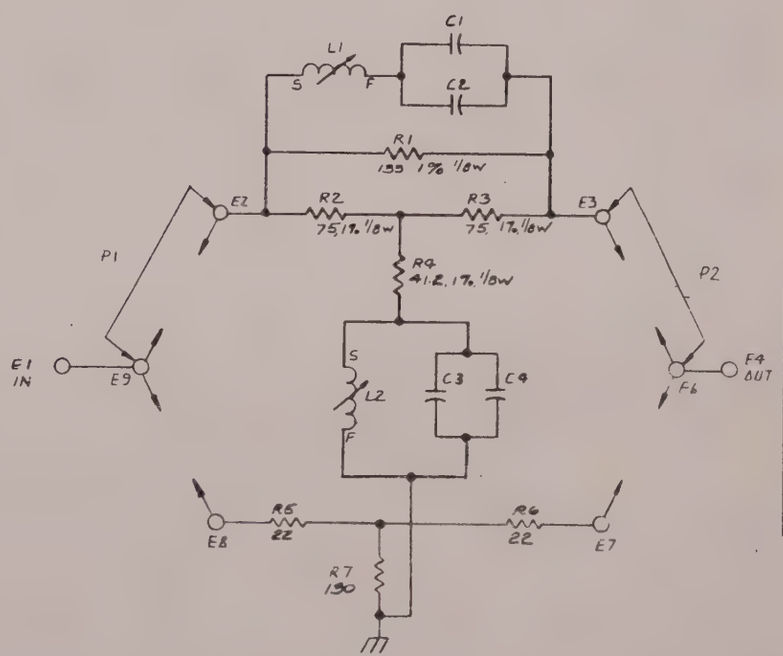
CONIC FORM 1976

LOCAL OSC – PWR AMPL
+ MULTIPLIER



PHASE EQUALIZER

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		B	R5, 6, 7 ADDED ALL RESISTORS WERE 1/8 W	5-3-72	
			CHAN 300 R4 WAS 39Ω. CHAN 1200 ADDED ADDED RESISTANCE VALUES FOR R5, R6, R7	2-2-73	
		C	CHANGED R1 TO 133 WAS 140 (600, 1/8W) R2 AND R3 ADD 1%, 1/8W, R4 41.2 WAS 43 ADDED 1% 1/8W R5 AND R6 22, WAS 13, R7 130 WAS 220 REF DES L1 CHANNEL 600 3.3 WAS 2.2 ON, 969 2.2 WAS 5	3-20-74	



REF DES	CHANNELS			
	300	600	960	1200
C1	820	680	300	360
C2	820	120	220	15
C3	390	250	300	30
C4	620	250	20	200
L1	6.8	3.3	2.2	1.5
L2	10.0	4.7	3.3	2.2

4. INDUCTOR VALUES IN MICROHENRIES
3. CAPACITOR VALUES ARE IN PICOFARADS.
2. RESISTORS ARE IN OHMS ±5% 1/4 WATT
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY
	TCM-6A	

REQD PER ASSY	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO	ZONE

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES

LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387

ANGULAR ± 0° 30'

ALL MACHINED SURFACES √

FINISH

CONTRACT NUMBER

RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT

DESIGN ACTIVITY APPROVAL

DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CA

SCHEMATIC
PRE EMPHASIS (MESSAGE)

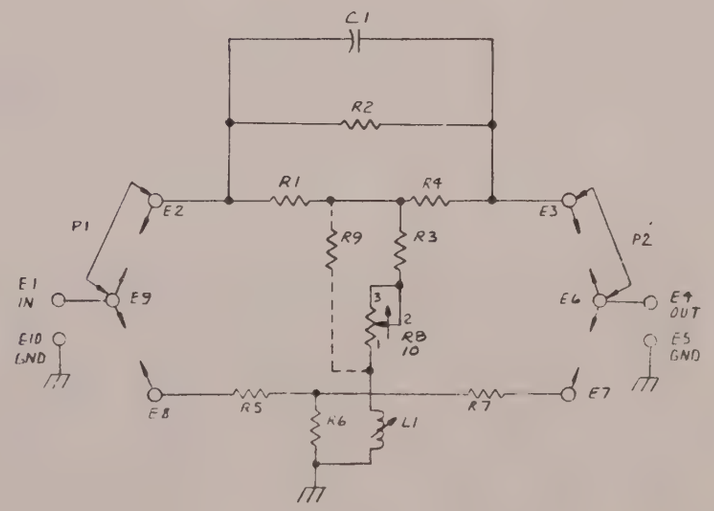
SIZE	CODE IDENT NO	DRAWING NUMBER	LTR
C	15895	12011023	

SCALE NONE SHEET OF

12011023 C

PRE-EMPHASIS (MESSAGE)

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		[illegible]	PER ARTWORK CHANGE #6	7-22-71	
		[illegible]	R5 & 7 ADDED RESISTORS WERE 1/8 W	5-2-72	
		C	ADDED R8, R3 (WAS) 20, 18 [illegible] PER DCN 0029 #8	9 1073	
		D	CHANGED RES VALUES W FLAT PADS	2-8-74	[illegible]



REF DES	LINES				
	405	[illegible]	625	819	1025
C1		[illegible]	[illegible]	910	
L1		[illegible]	10	4[illegible]	
R1		[illegible]	75	75	
R2		[illegible]	300	300	
R3		[illegible]	15	15	
R4		[illegible]	75	75	
R5 & R7		[illegible]	3	27	
R6		[illegible]	220	82	

12011024 C

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE

REQD PER ASSY

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER
RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CA

SCHEMATIC
PRE-EMPHASIS (T.V)

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011024	D

SCALE [illegible] SHEET OF 1

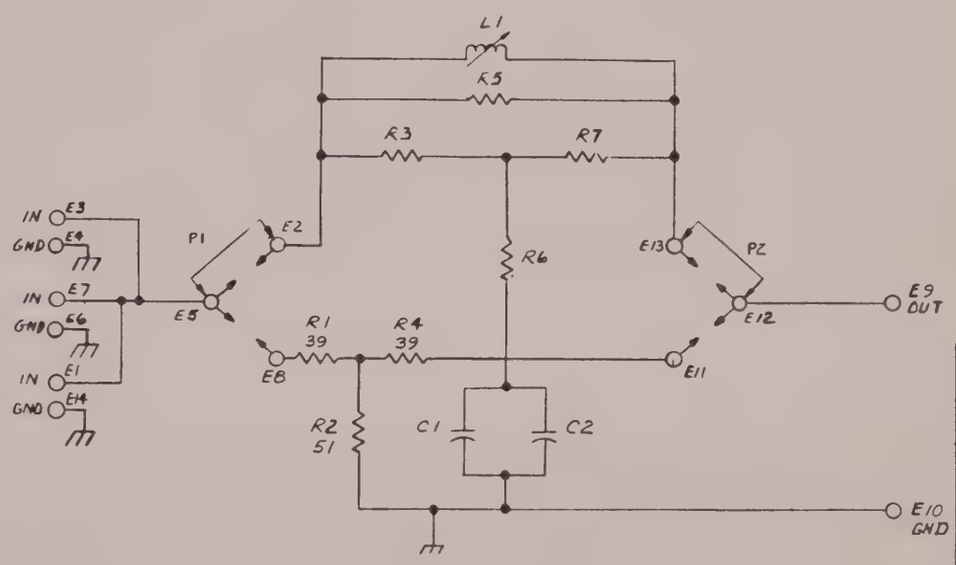
4. INDUCTORS ARE IN MICROHENRIES
3. CAPACITORS ARE IN PICOFARADS
2. RESISTORS ARE IN OHMS ± 5% 1/4 W
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

PRE-EMPHASIS (T.V.)

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	PER ARTWORK CHANGE	7-22-71	
			R1 FROM 51 TO 36, R2 FROM 33 TO 51, R4 FROM 51 TO 39	12-2-71	
		B	E1, E14 AND LINES 1025 ADDED	5-10-72	



REF DES	LINES				
	405	525	625	819	1025
C1		8200	5100	2400	
C2		680	330	330	
L1		47	27	15	
R3		75	75	75	
R5		270	300	300	
R6		20	20	20	
R7		75	75	75	

12011026 B

4. INDUCTORS ARE IN MICROHENRIES
3. CAPACITORS ARE IN PICOFARADS
2. RESISTORS ARE IN OHMS ±5%, 1/4W
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

REQD PER	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

DESIGN ACTIVITY APPROVAL

DESIGN APPROVAL

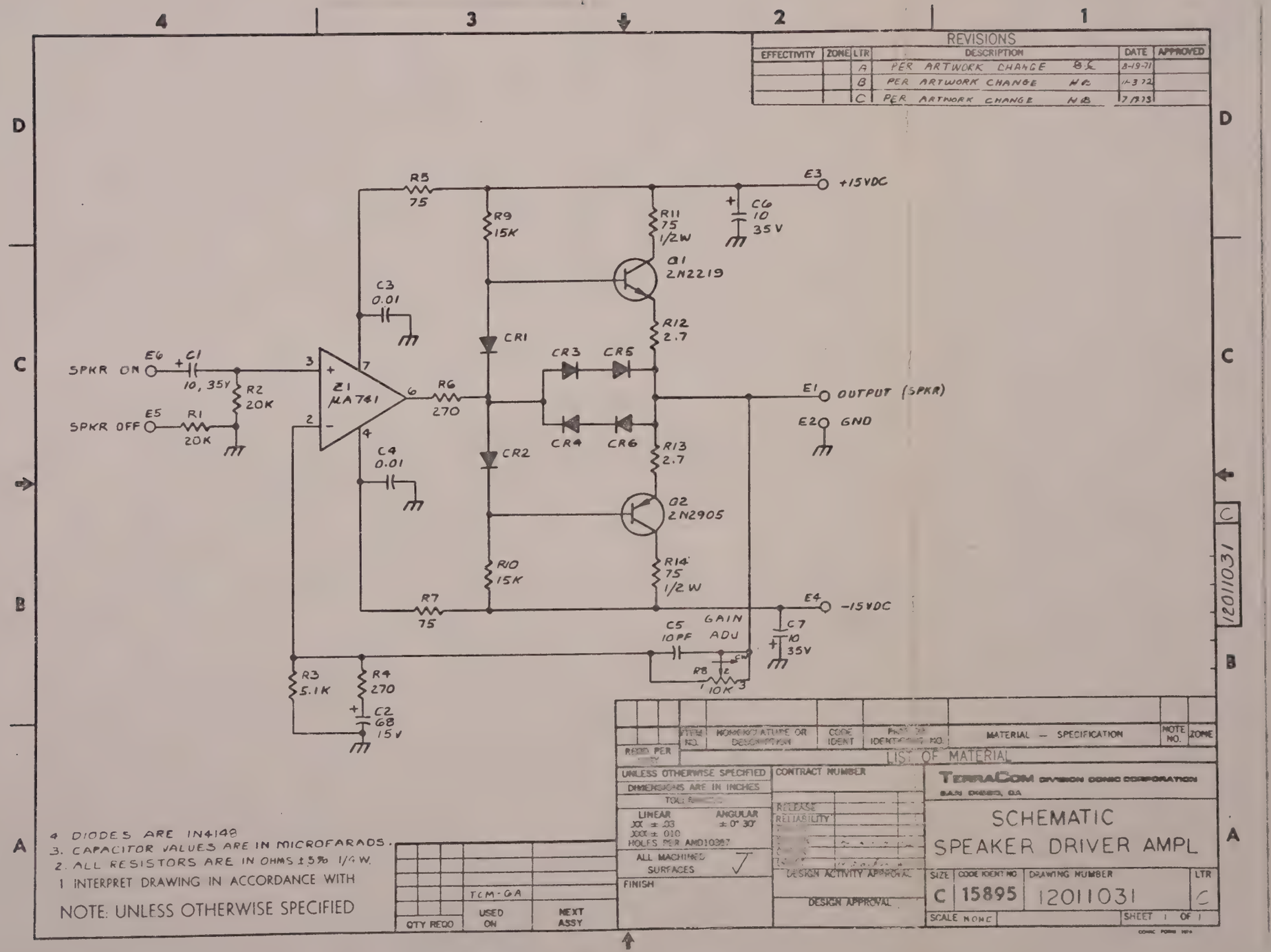
TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CA

SCHEMATIC
DE-EMPHASIS (TV)

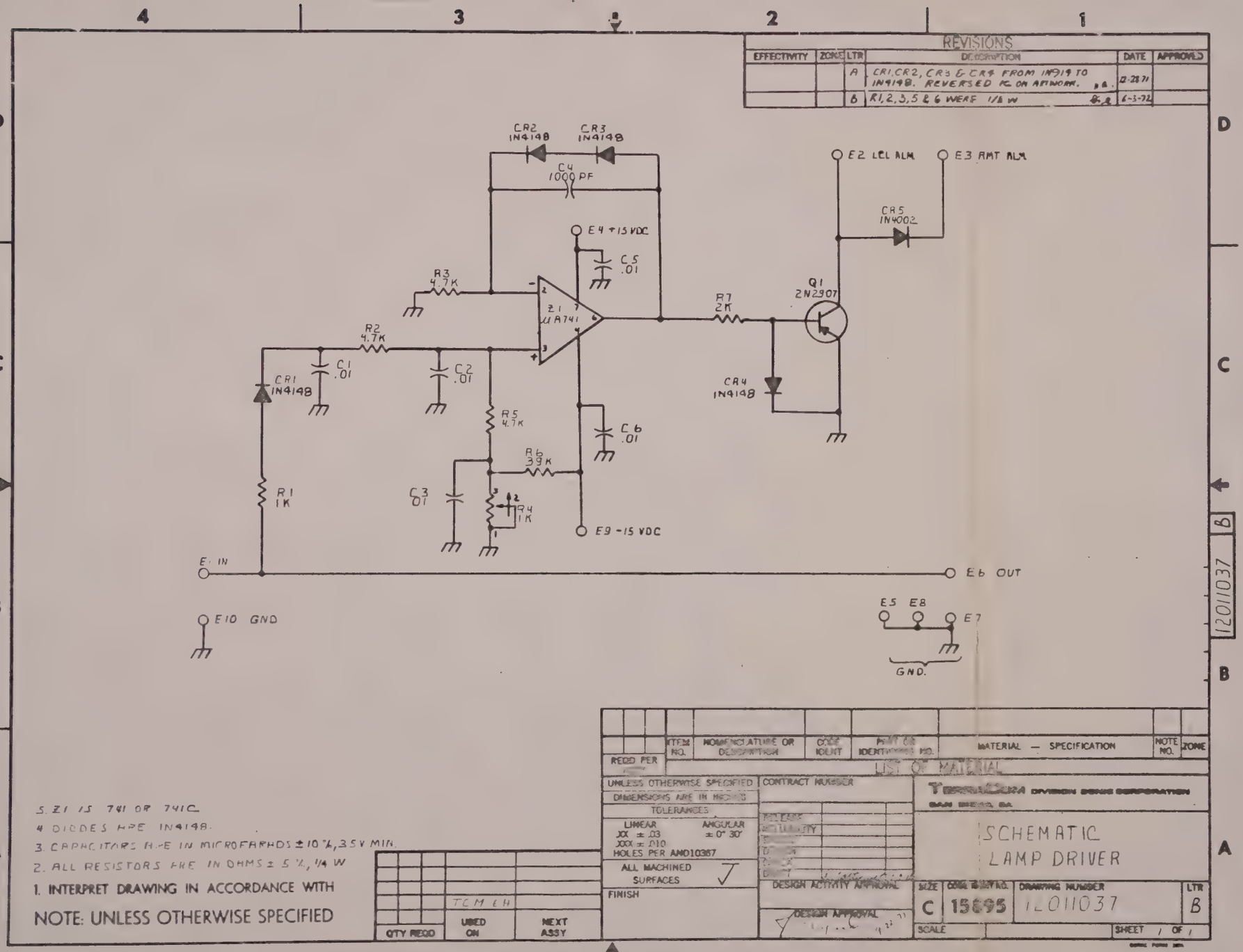
SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011026	B

SCALE NONE SHEET 1 OF 1

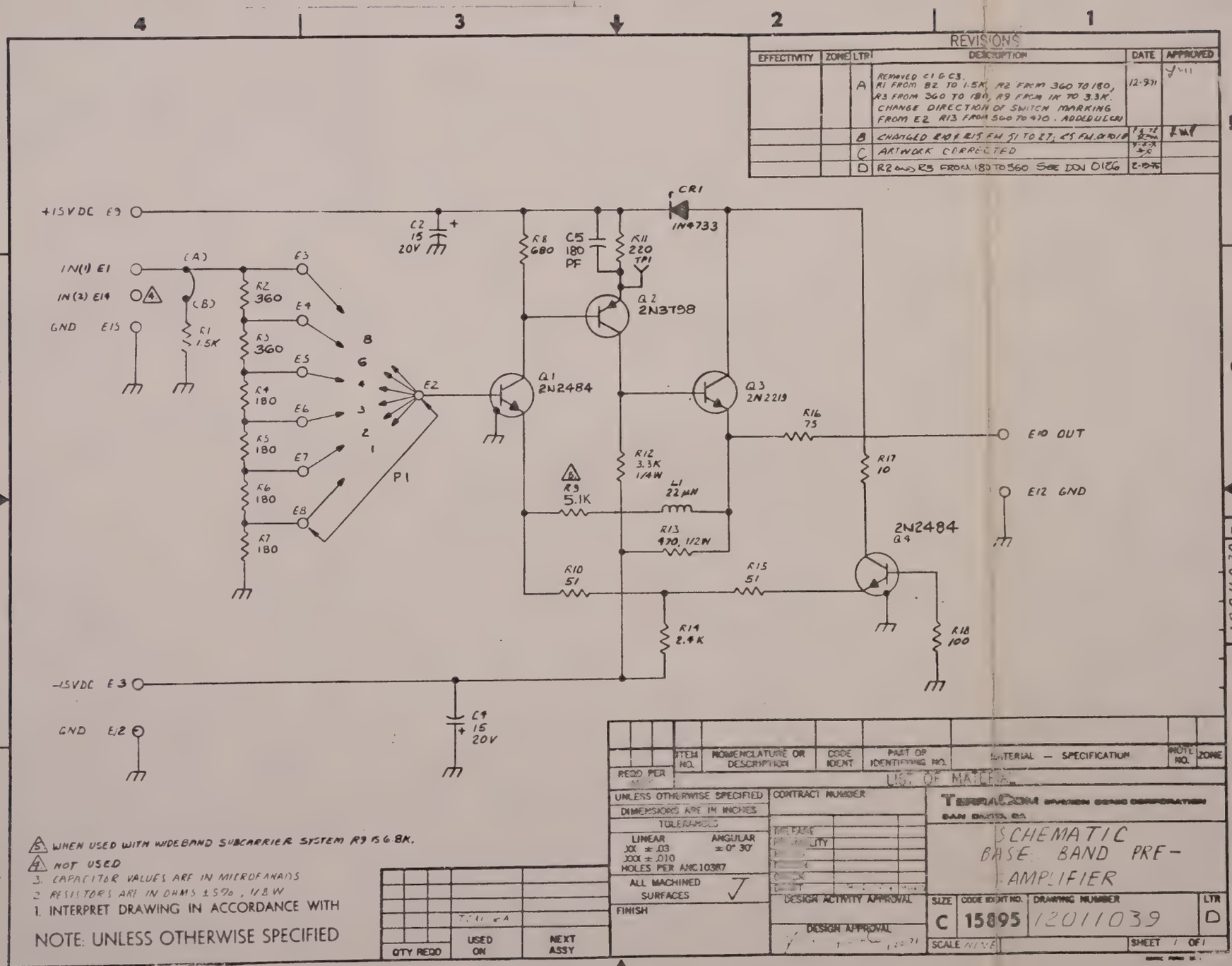
DE-EMPHASIS (TV)



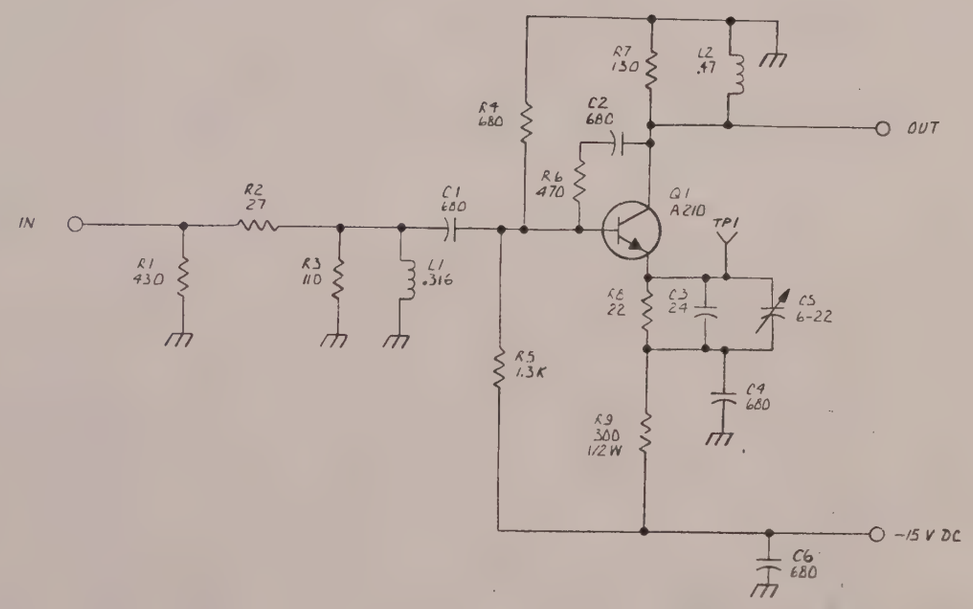
SPEAKER DRIVER AMPL.


REVISIONS
EFFECTIVITY | ZONE | LTR | DESCRIPTION | DATE | APPROVED
A | CR1,CR2, CR3 & CR4 FROM IN919 TO IN4148. REVERSED PC ON ARTWORK. | 12-28-71
B | R1,2,3,5 & 6 WERE 1/8 W | 6-3-72
CR2 IN4148
CR3 IN4148
C4 1000 PF
E2 LCL ALM
E3 RMT ALM
CR5 IN4002
E4 +15 VDC
C5 .01
R3 4.7K
Z1 µA741
Q1 2N2907
R7 2K
R2 4.7K
C1 .01
C2 .01
CR1 IN4148
CR4 IN4148
R5 4.7K
C6 .01
R6 39K
R1 1K
C3 .01
R4 1K
E9 -15 VDC
E1 IN
E6 OUT
E10 GND
E5 E8 E7
GND.
5. Z1 IS 741 OR 741C.
4. DIODES ARE IN4148.
3. CAPACITORS ARE IN MICROFARADS ± 10 %, 35 V MIN.
2. ALL RESISTORS ARE IN OHMS ± 5 %, 1/4 W
1. INTERPRET DRAWING IN ACCORDANCE WITH
NOTE: UNLESS OTHERWISE SPECIFIED
ITEM NO. | NOMENCLATURE OR DESCRIPTION | CODE IDENT | PART OR IDENTIFYING NO. | MATERIAL — SPECIFICATION | NOTE NO. | ZONE
REQD PER
LIST OF MATERIAL
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AMD10367
ANGULAR ± 0° 30'
ALL MACHINED SURFACES
FINISH
CONTRACT NUMBER
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL
TCM EH
QTY REQD | USED ON | NEXT ASSY
SCHEMATIC
LAMP DRIVER
SIZE C | CODE IDENT NO. 15695 | DRAWING NUMBER 1L011037 | LTR B
SCALE | SHEET 1 OF 1
1L011037 B

LAMP DRIVER



BASE BAND PRE-AMP



REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE	REQD PER ASSY
	LIST OF MATERIAL						

QTY REQD	USED ON	NEXT ASSY
	PC 11-6A	

4. COILS ARE IN MICROHENRIES
3. CAPACITORS ARE IN PICOFARADS
2. RESISTORS ARE IN OHMS ± 5%, 1/4 W
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR XX ± .03 XXX ± .010 ANGULAR ± 0° 30'
HOLES PER AND10387
ALL MACHINED SURFACES ✓
FINISH

CONTRACT NUMBER

RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CA

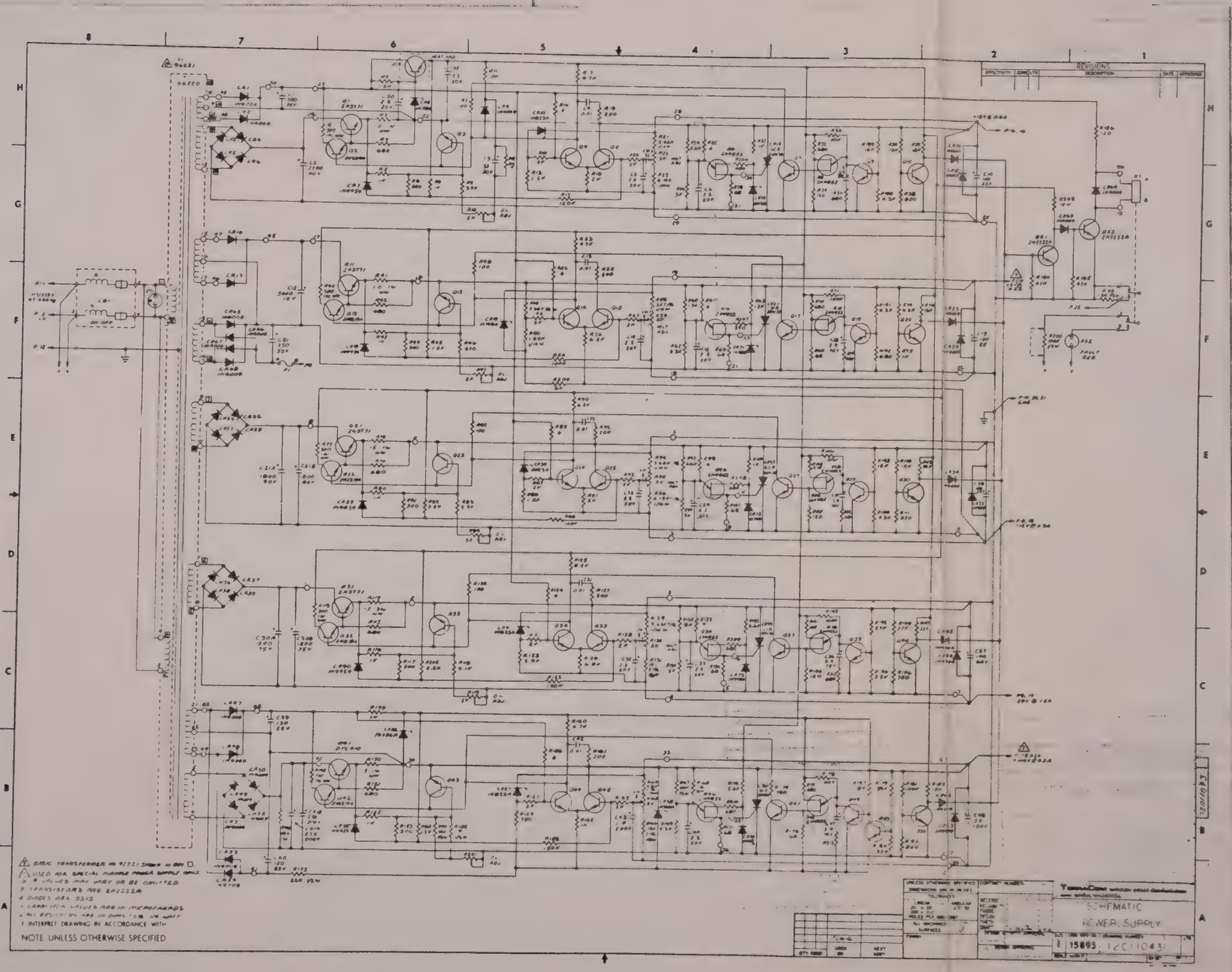
SCHEMATIC
70 MHz ISOLATION AMP

SIZE	CODE IDENT NO	DRAWING NUMBER	LTR
C	15895	12011041	

SCALE NONE | SHEET 1 OF 1

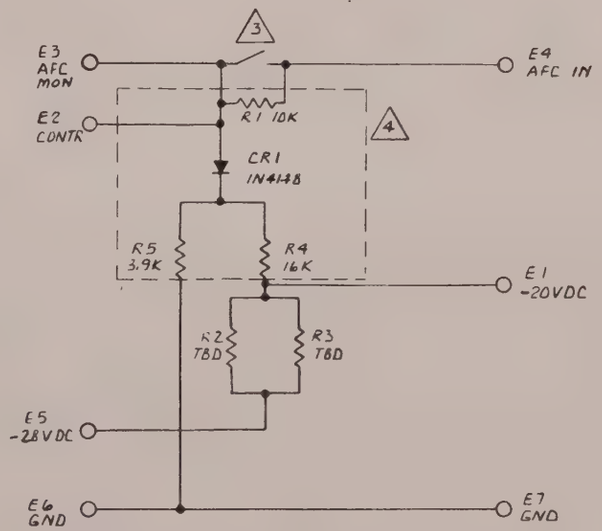
12011041

70 MHz ISOLATION AMP



POWER SUPPLY

REVISIONS					
EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	ARTWORK MARKING CHANGE: E3 (WAS) AFC IN, E4 (WAS) AFC MON	11-3-72	



4 NO COMPONENTS FOR OTHER THAN 13 GHz

3 OPEN FOR 13 GHz ONLY

2. ALL RESISTORS ARE IN OHMS ± 5%, 1/8 W

1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE
REQD PER ASSY						

LIST OF MATERIAL

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR .XX ± .03 .XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES √
FINISH

CONTRACT NUMBER

RELEASE	
RELIABILITY	
ENGRG	
DESIGN	
CHECK	
DRAFT	
DESIGN ACTIVITY APPROVAL	
DESIGN APPROVAL	

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

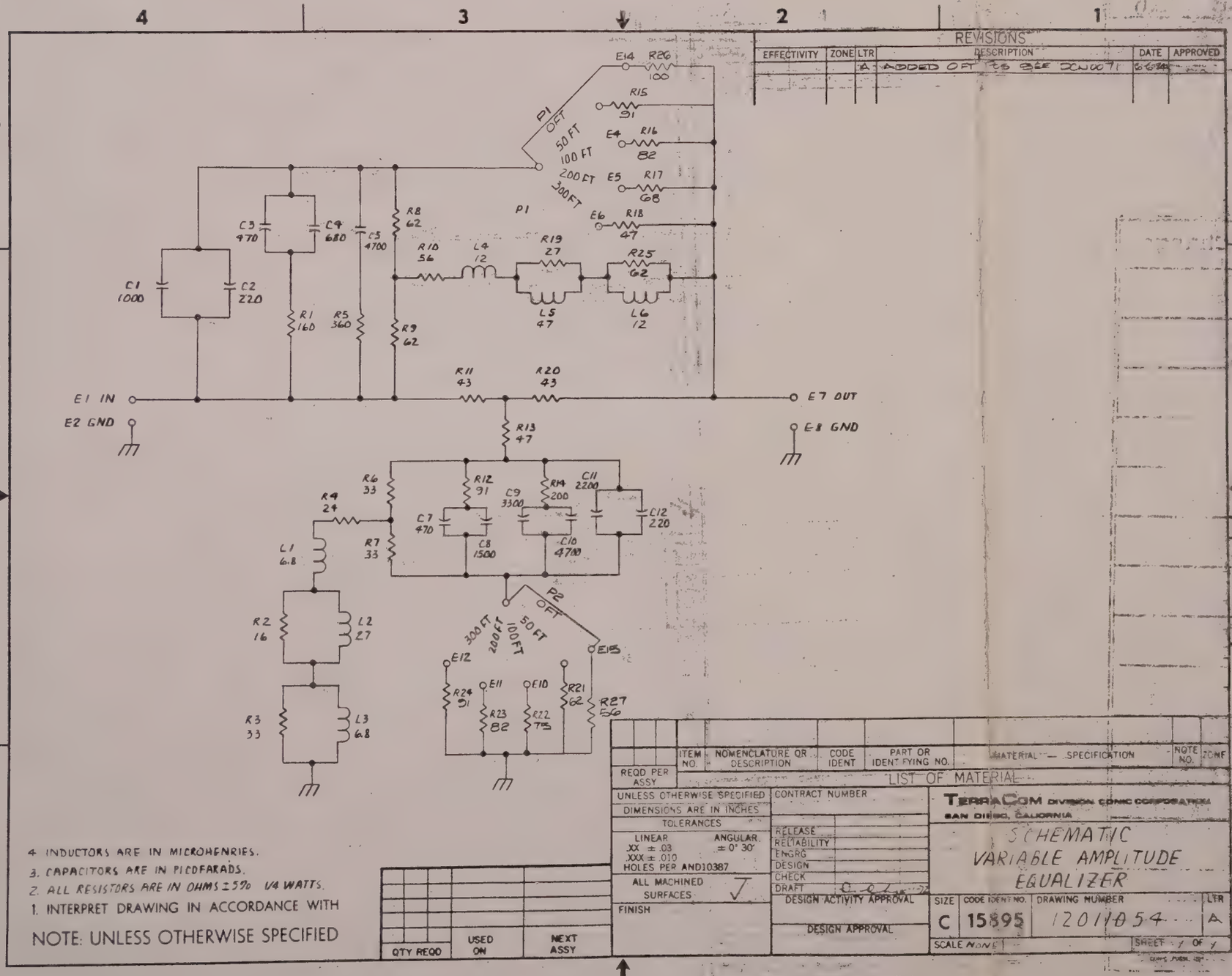
SCHEMATIC
RCVR VCO INTERFACE

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	12011044	A

SCALE NONE | SHEET 1 OF 1

12011044 A

RCVR VCO INTERFACE



REVISIONS

EFFECTIVITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED
		A	ADDED OPT 05 SEE DCN0071	6-6-68	

4. INDUCTORS ARE IN MICROHENRIES.
3. CAPACITORS ARE IN PICOFARADS.
2. ALL RESISTORS ARE IN OHMS ±5% 1/4 WATTS.
1. INTERPRET DRAWING IN ACCORDANCE WITH

NOTE: UNLESS OTHERWISE SPECIFIED

QTY REQD	USED ON	NEXT ASSY

ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT	PART OR IDENTIFYING NO.	MATERIAL — SPECIFICATION	NOTE NO.	ZONE
REQD PER ASSY	LIST OF MATERIAL					

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
LINEAR XX ± .03 XXX ± .010 HOLES PER AND10387
ANGULAR ± 0° 30'
ALL MACHINED SURFACES
FINISH

CONTRACT NUMBER

RELEASE
RELIABILITY
ENGRG
DESIGN
CHECK
DRAFT
DESIGN ACTIVITY APPROVAL
DESIGN APPROVAL

TERRACOM DIVISION CONIC CORPORATION
SAN DIEGO, CALIFORNIA

SCHEMATIC
VARIABLE AMPLITUDE
EQUALIZER

SIZE	CODE IDENT NO.	DRAWING NUMBER	LTR
C	15895	1201054	A

SCALE NONE | SHEET 1 OF 1

1201054 A

VARIABLE AMPLITUDE
EQUALIZER

Document Title: Product Manuals	Document Number: ESC-2650-93-01
Revision Number: A_ B_ C_ D_ E_	Page: N/A
Prepared By: Rick Schultz	Approved By:
Issued By: Jim Steinau	Issue Date: 10/19/93

CHANGE NOTICE SUMMARY

Revision	Reason for Change	Date of Change

Revision	Reason for Change	Date of Change